RAILROAD GAZETTE

SATURDAY, SEPTEMBER 2, 1871.

Tank Engine.

With this impression we publish an engraving of a tank engine built for the Midland Railroad and intended for the metropolitan traffic in London. The engine was constructed by Messrs. Beyer & Peacock, of Manchester, from the designs of Mr. Kirtley, the Locomotive Superintendent of the Midland line. Our engraving is copied from a lithograph published in *The Engineer*.

It will be seen, by examining the engraving, that the plan of engine is identical with that patented by Mr. Forney, in this country, and that it possesses the advantage of carrying the whole weight of the boiler and machinery on the driving wheels, the water and coal on the truck, with a long wheel-base for steadiness of running. Although these features are advantages under all circumstances, yet for traffic requiring frequent stops and heavy trains, such as that of metropolitan lines, engines of this kind are especially adapted. The condensing apparatus will also attract attention; but the inside cylinders will, we think, be generally condemned in this country.

For the following specifications of these locomotives we are also indebted to *The Engineer*.

SPECIFICATION OF LOCOMOTIVE TANK ENGINES WITH BOGIE AND CONDENSING APPARATUS.

The engines must be made to the dimensions given in the accompanying description, and the quality of material used to be of the make specified; and when no such instructions are given, to be of the very best of their respective kinds, and the engines must be fitted and finished in every respect in the most complete manner, and to the satisfaction of the company's Locomotive Superintendent.

The engines must be delivered by the builders to the company at Derby, carriage paid, fit and ready for work, and prior to payment each engine will be required to run 1,000 miles; and the builders will be held responsible for all defects (except by accidents) until they have run that distance.

LOCOMOTIVE DEPARTMENT, DERBY, September, 1869.

DESCRIPTION OF TANK ENGINE.

*Boiler.**

	Feet.	Inches.
Length	11	0
Diameter	4	3

Boiler.

	Feet.	Inches.
Diameter of rivets	0	¾
Distance apart of rivets in adjoining rows	0	2
Distance apart of rivets in the same row	0	2¼
Distance from edge of sheet to second row of rivets	0	4
Thickness of plates	0	7-16
Thickness of tube-plate	0	½

Outside Fire-box.

Description: Level with top of boiler.

Length	5	3
Breadth	4	1
Depth below boiler	2	6
Thickness of plates	0	½
Thickness of fire-box front	0	⅝
Diameter of rivets	0	⅝
Distance apart of rivets in adjoining rows	0	1⅝
Distance apart of rivets in same row	0	2
Distance of second row of rivets from edge of sheet	0	8½
Distance of copper stays apart	0	4
Diameter of copper stays	0	⅞

Bottom ring solid.

Inside Fire-box.

Description: Copper.

Length	4	6⅝
Breadth	3	0
From top of box to grate	4	11
From bottom of box to top (inside)	5	8¼
Water spaces, sides 2½ inches, front and back	0	3
Thickness of plates	0	½
Thickness of tube-plate	0	⅝
Fire door	1 ft. 6 in. x 11 in.	
Number of roof stays	8	

Regulator.

Description: Swan neck, with double slide. Steam way, area, 18 square inches. Steam pipes, copper.

Cylinders.

	Feet.	Inches.
Diameter	1	5
Stroke	2	0
Distance of centers	2	6
Distance of centers of valve-spindles	0	5
Diameter of centers of valve-spindles	0	1¾
From center of cylinder to center of valve-spindle	1	½
Number bolts in front flange, 13; diameter	0	⅝
Number bolts in back flange, 14; diameter	0	⅝
Thickness of the cylinder	0	⅝
Diameter of piston-rod	0	2⅝
Depth of piston	0	3

Description: Brass.

Depth of packing	0	1
Distance between inside of ports	2	1⅜
Distance between inside of covers	2	4

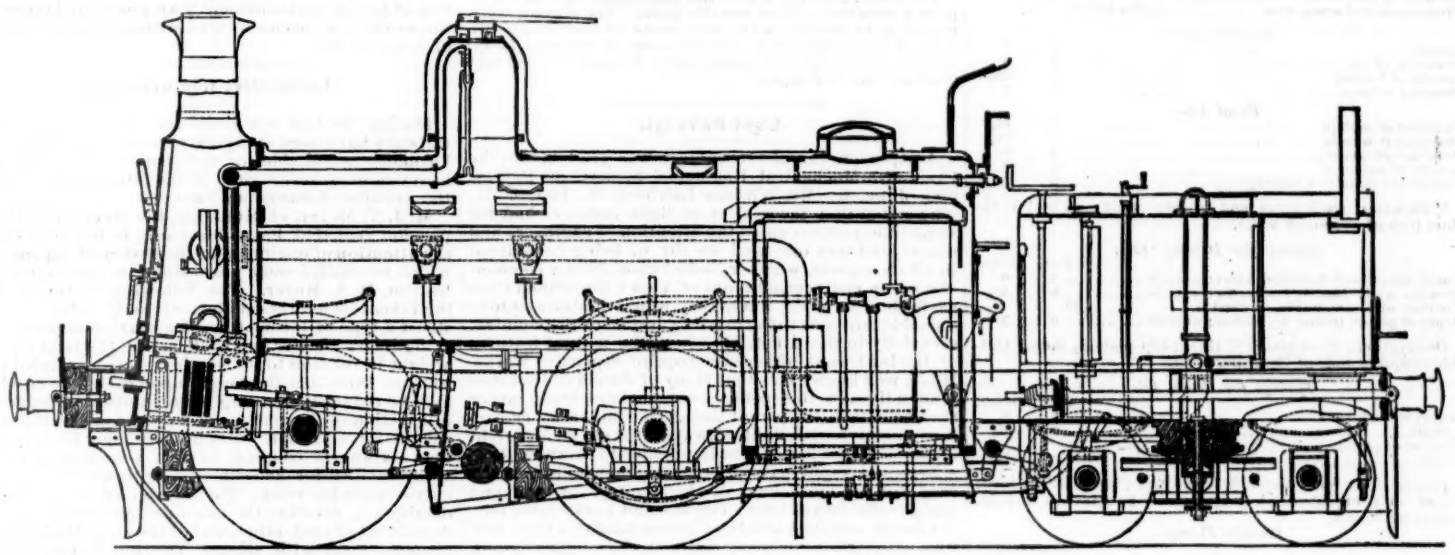
Ports.

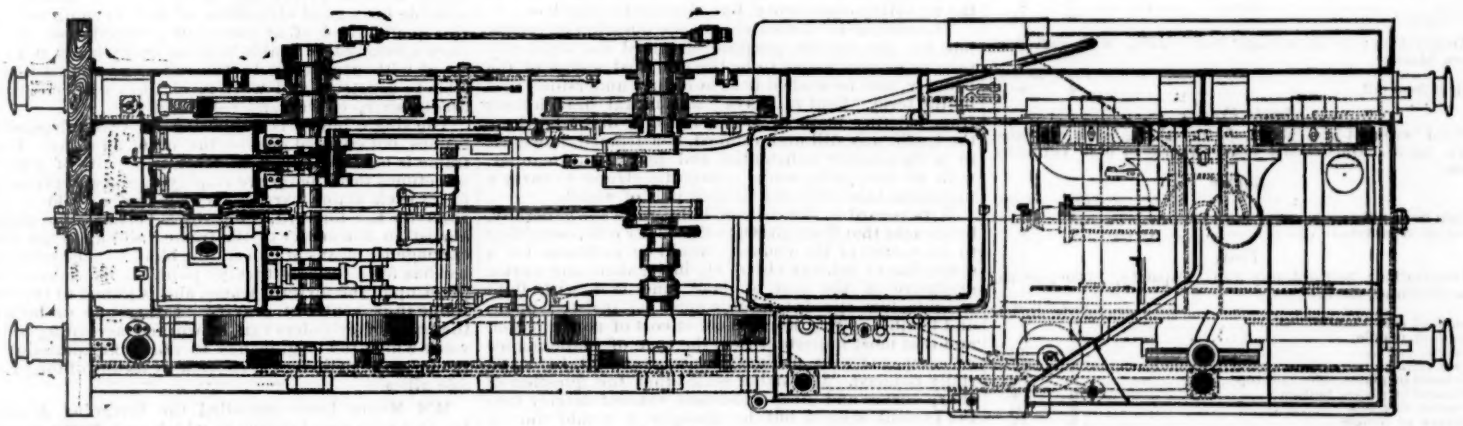
Breadth	1	3
Length of steam	0	1⅜
Length of exhaust	0	3⅛
Thickness of bridge	0	1

Slide Valves.

Description: Brass.

Lead	0	3-16
Steam overlap	0	1
From face of slide to center of spindle	0	1





*Boiler-barrel, outside fire-box and smoke-box plates, also rivets, stays and hoops to be of the best Yorkshire iron, of Lowmoor, Bowling Taylor's, Cooper's or Farnley Iron Company's make. The boiler-barrel to be formed of three plates with longitudinal and transverse butt joints, outside hoops and stripes. The dome to be of thick-edged plate, welded and flanged. The whole of the boiler barrel and outside fire-box to be double-riveted.

	Feet.	Inches.
Depth in middle	0	7
Depth at end	0	5
Thickness	0	1⅛
Number of bolts in each, 11; diameter	0	⅞
Breadth of fire-bars at top	0	1¾
Breadth of fire-bars, distance apart	0	¾
Rivets of copper, diameter	0	⅞
Distance of centers	0	1⅝
Steam pipe, copper, diameter	0	5
Fire-door ring, brass; section	3 in. x 2¼ in.	

Tubes.

Description: Brass. Best selected—Green's patent drawn; to be supplied by approved makers.

	Feet.	Inches
Length	11	5½
Diameter outside	0	2
Distance of centers	0	2⅝
No. 10 and 13 wire gauge.		
Number	167	

Smoke-box.

Description: Square onto cylinders.

Length, inside	2	6¼
Breadth, inside	4	1¾
Depth below boiler	0	5¼
Thickness of plates	0	⅜
Diameter of rivets	0	⅝
Distance of centers	0	2

Chimney.

Diameter outside at top	1	8
Diameter outside at bottom	1	4
Height of top from rail	12	6
Thickness of plate	0	¼
Diameter of rivets	0	⅜
Distance of centers	0	2

Blast Pipe.

Description: Copper.

Diameter at top	0	4½

Safety Valves.

Description: Double on dome cover. Brass.

Diameter	0	4

Link motion, made of best Yorkshire iron, carefully fitted and case-hardened to drawings and templates supplied.

Eccentrics.

Description: Metal sheaves; wrought iron straps, lined with brass and Babbitt's patent metal.

	Feet.	Inches.
Throw	0	6½
Diameter	1	3½
Number	4	
Breadth of straps	0	3

Reversing Shaft.

Diameter of way bar for lifting eccentric rods	0	3¼
Number of bearings	3	
Diameter of bearings	0	3
Length of bearings	0	5

Description of bracket-bearings: Brass.

Motion Bars—Cast Steel.

Length	4	4⅝
Breadth	0	2¾
Distance apart	0	3
Thickness (parallel)	0	1⅜
Length of block	0	9

Cross-Head.

Diameter of pin for blocks	0	1⅞
Diameter of boss for piston rod	0	4¼
Diameter of bearing for connecting rod	0	3
Length of bearing for connecting rod	0	3
Cross section of arms	4⅝ in. x 1⅜ in.	

The whole of the wrought iron in cylinders, eccentric straps, cross-heads, pistons and pumps to be made of best Yorkshire iron.

Pumps.

	Feet.	Inches.
Diameter of plunger	0	1¾
Stroke	2	0

Description: Brass.

Thickness of metal	0	⅛
Diameter of water way	0	·2
Rise of ball in pump clock seat	0	¾
Rise of ball in boiler clock seat	0	5-16

Front and Driving Wheels (wrought iron).

	Feet.	Inches.
Diameter	5	2
Breadth of outside tires	0	5½
Thickness of outside tires	0	2⅛
Height of flange	0	1¼
Inside rim:		
Breadth	0	5
Thickness at edge ½ in., at middle	0	1¼
Spokes—Flat.		
Number	16	
Dimensions at top	3x1¼ inches.	
Dimensions at bottom	3¾x1⅝ inches.	
Boss:		
Diameter	1	4
Breadth	0	6¼
Diameter of hole	0	7½

All the wheels to have cast-steel tires of approved make.

Distance of Centers of Wheels.

	Feet.	Inches.
Driving wheels from front wheels	8	0
Driving wheels from bogie center	12	3

Driving Axle.

From fire-box	2	0
Distance below boiler	1	11
Diameter in middle	0	6½
Diameter where wheels are on	0	7⅝
Diameter of crank pins	0	7
Length of crank pins	0	4
Diameter of inside bearings	0	6¼
Length of inside bearings	0	8
Distance of centers of inside bearings	4	0
Diameter of outside bearings	0	8
Length of outside bearings	0	8
Distance of centers of outside bearings	6	3
Cross section of crank arms	11x4⅛ inches.	

Outside Cranks.

Length	1	0
Diameter of pin	0	8
Length of bearing	0	3¼
Diameter of boss	1	0

Front Axle.

Diameter at middle	0	6¼
Diameter at wheels	0	7½
Diameter of bearings	0	6
Length of bearings	0	8
Distance of centers of bearings	6	3

Plain axles, crank axles, and outside cranks of best Yorkshire iron of approved make.

Springs for Driving Axle.

	Feet.	Inches.
Length when loaded, inside, 3 feet; outside	3	0
Breadth when loaded, inside, 3½; outside	0	4½
Number of plates, inside, 8; outside	13	
Depth of plates, inside, 3⅛ inches; outside	0	5

Description: Steel plates ⅝ thick; top plate ¼ inch. Outside coupling rods of Bessemer steel.

Springs for Front Axle.

	Feet.	Inches.
Length when loaded	3	0
Breadth	0	4½
Number of plates	20	
Depth	0	7⅝

Description: Steel plates, ⅝-inch thick; top plate, ¼-inch. Front and outside driving springs to be attached to compensating beams.

Outside Frame.

	Feet.	Inches.
Extreme length	30	0
Depth	1	2
Thickness	0	1⅛

Description: Solid wrought-iron plates, with cast-steel horn blocks.

	Feet.	Inches.
Height from rail	4	0

Inside Frame.

Solid wrought-iron plates, ⅞-inch thick, with cast-steel horn blocks. Outside and inside frames of best Yorkshire iron.

Buffers.

	Feet.	Inches.
Height from rail	3	4
Distance of centers	5	8

Tank.

Description: Best ordinary iron. Capacity, 1,000 gallons. Placed behind the fire-box.

	Feet.	Inches.
Length at side	8	0
Length at middle	4	3
Breadth	3	3½
Depth	3	6
Thickness of plates, sides and top	0	¼
Thickness of plates, bottom	0	⅜
Diameter of rivets	0	½
Distance of centers	0	1⅝

Bogie.

Description: Adams' patent, with circular and lateral motion to center-pin.

Frames.

Wrought iron plates 1 inch thick, with cast-steel horn-blocks. Framing of best Yorkshire iron.

Wheels.

Description: Wrought iron.

	Feet.	Inches.
Number	4	
Diameter	3	0
Distance of centers	5	0
Outside tires, breadth	0	5⅝
Outside tires, thickness	0	2¼
Inside rim, breadth	0	5
Inside rim, thickness at edge	0	1⅛
Inside rim, thickness at middle	0	1¾
Spokes—Flat.		
Spokes, number	9	
Spokes, dimensions, top	3x1¼ inches.	
Spokes, dimensions, bottom	3½x1⅝ inches.	
Boss, diameter	1	1
Boss, breadth	0	6
Boss, diameter of hole	0	6

Wheels to have cast-steel tires of approved make.

Axles.

Diameter at middle	0	4¾
Diameter of bearings	0	5
Length of bearings	0	8
Distance of centers	3	9

Bearing-Springs.

Length when loaded	2	6
Breadth	0	4½
Number of plates	10	
Depth	0	3⅞

Description: Steel plates ⅝ inch thick; top plate, ¼ inch. The springs to be attached to compensating beams.

Condensing Apparatus.

A 5¼-inch exhaust valve fixed on each side of the smoke-box and worked from the foot-plate, by which the exhaust steam may be directed to either the chimney or the tank; a copper pipe 5⅛ inches in diameter outside communicating with the tank on each side of the engine.

A 10-inch discharge-valve at bottom of the tank, worked from the foot-plate.

Lagging.

Boiler and fire-box shell to be covered with sheet iron, No. 14 W. G., secured to wrought-iron belts in the manner adopted by the Midland Railway Company.

One No. 8 injector, brass. (Giffard's patent.)
Patent steam gauge.
Weather screen with two plate glass lights.
One pet cock.
One whistle.
Two gauge cocks.
Two blow-off cocks.
One gauge-glass frame.
Two cylinder cocks.
One steam-chest cock.
One lubricator.
Eight wash-out plugs at bottom of fire-box and one at top.
Four wash-out plugs in smoke-box tube plate.
Two sand-boxes, worked from foot-plate.
One jet cock.
Air-tight damper to ash-pan.
Balance weights in wheels.
One set fire bars and tools, complete.
Brake to front and driving wheels.
Screw coupling at each end of engine.
Gauge of Railway, 4 feet 8½ inches.

Painting.

The boiler, framing, wheels and tank (inside and out) to be primed with two coats of metallic paint. The engines, when lagged, to be painted with three coats of lead color, two coats of Brunswick green, with two coats of varnish. Chimney, smoke-box and foot-plating to be finished with one coat black and one coat japan.

Light Railways.

A paper on the above subject was read before the Civil and Mechanical Engineers' Society, on Friday, 30th June, by Mr. William Lawford, M. Inst. C. E., who stated that the subject of light railways had for some time past occupied the attention of engineers and others, and was one well worthy of being considered in all its aspects, whether looked upon from a commercial or an engineering point of view; for branch lines as feeders to main lines, they would doubtless prove valuable adjuncts to the existing system of the country, especially in those districts where the natural features of the land would otherwise require expensive works. It is a well known fact that many of the old constructed branch lines in this country are suckers from, rather than feeders to, the parent lines. One important feature in connection with light railways must not be lost sight of, namely, that it would be impossible to carry on them a large and rapid passenger traffic, such as is now the case with the main lines of the country. A large and rapid traffic means heavy engines and heavy rails, etc., but for an omnibus and light goods traffic, a light railway with light permanent way materials, light engines, etc., might be made with great advantage, not only to the traveling community, but also to shareholders.

The author did not enter into the question of gauge, but for the present purpose assumed the 4-feet 8½-inch or narrow gauge to be the practical gauge of the country, and he wished it to be clearly understood that by the term "light railways" was meant branch lines from existing main or trunk lines, to districts where the traffic was still undeveloped, constructed, however, in a thoroughly substantial and permanent manner, with all the parts made sufficiently strong to carry a maximum load of 5 tons on each pair of wheels.

With regard to the cost of light railways generally, he thought that from £3,000 to £3,500 per mile, according to the nature of the country, would be sufficient for a single line of railway (4-feet 8½-inch gauge) and works, exclusive of the cost of land, and that with light weights, low speeds (and this must be insisted upon) and flexible rolling stock, the first cost of construction, and that most important item the cost of maintenance as compared with ordinary railways might be materially reduced. He further stated that the question of sharp curves and steep gradients entered largely into the present subject, but he thought it would not be denied that a line with steep gradients and sharp curves, constructed at a moderate first cost, would give a lower final result in working expenses (taking into account the saving of interest on capital) than a line made at a heavy cost with easy gradients and large curves.

Railway accommodation had become almost as much an essential to this country as air and water. It might have answered the purpose of certain localities that they should enjoy railways, and that others should be deprived of them, but the experience of the past had taught wisdom, and whereas, in former years, landowners and others used their utmost exertions to drive railways from them, they were now raising their voices to have them brought to their very doors. Expensive tunnels, high embankments, deep cuttings, magnificent viaducts, palatial stations, etc., were not required, nor should the light railways be laid out with the view of leaving to posterity monuments of engineering skill and extravagance, but all the latest improvements and inventions should be adopted, by means of which even a district of hills and valleys might be supplied with railway accommodation at a comparatively moderate cost, and there was no doubt that in many instances the lines would be executed by the landowners themselves and others locally interested, who would, of course, be opposed to all unnecessary expenditure.

The author then gave a description of a short line of light railway which his firm had lately constructed for His Grace, the Duke of Buckingham and Chandos, by means of which the Duke's estates at Wootton are brought into connection with the Aylesbury & Buckingham Railway, at Quainton. This line (4-feet 8½-inch gauge) is six miles in length, with a branch of 1½ miles; it is throughout eminently a line of light works, and with few exceptions a surface line, the highest embankment being 12 feet, and the deepest cutting 10 feet. There are no road bridges, the turnpike and other roads being crossed on the level.

The rails are bridge rails, weighing 30 pound per yard, and are secured on to longitudinal creosoted timbers 6 inches by 6 inches by means of fang bolts. There are transoms 4 inches by 4 inches at every 12 feet, kept in their places by a wrought-iron tie-rod ¾ inch thick under the bottom of the timbers; the line is only partially fenced, the existing hedges being utilized for that purpose.

The main line starts from the Quainton station of the Aylesbury & Buckingham Railway, crosses the Aylesbury & Bicester turnpike road about 1 mile to the west of Waddesdon, passes through Westcott and Wootton, and terminates at a point near the road leading from Wootton to Brill. The sharpest curve is ten chains radius (excepting that at the junction of the branch line, which is eight chains radius), and the steepest gradient 1 in 60.

Nearly 4 miles of the line have been in use since the early part of this year, and in the month of March alone more than 3,200 tons were carried over it; the line is at present being worked by horses. The estimate for the works was £1,400 per mile, exclusive of the cost of land, and the author did not think that amount would be exceeded. It must be remembered that there were no parliamentary expenses incurred on this line, that the works throughout are light, that all the roads are crossed with level crossings, and that (with the exception of laying the permanent way, points and crossings) the works have been executed without the intervention of a contractor.

Locomotive Improvements.

During the last few years the engineers of French railways have been studying various types of powerful locomotives, suitable for the economical transport of heavy mineral trains, or of trains intended specially for the working of secondary lines.

M. J. T. Meyer, of Mulhouse, the inventor of the expansion gear that bears his name, is just now calling the attention of engineers to the system of locomotives which he studied some years since in connection with his son, M. A. Meyer. The following is the problem the inventors addressed themselves to solve: To construct a type of locomotive of a maximum power, carrying its own water and coal, having the least possible weight in relation to its heating surface, carried upon so many axles that the weight upon each pair of wheels may be reduced to a minimum, in order to reduce the rail section of the permanent way; to utilize the whole weight for adhesion, without, however, having more than six wheels coupled, in such a manner as to give every facility for accommodating themselves to rapid curves upon the road. The solution of this problem is obtained by dividing the machine into two groups, independent of each other, and of the single boiler which supplies them with steam. The boiler can thus be made, without giving any instability, of dimensions suitable for a good utilization of fuel, even of an inferior quality, and of an abundant production of steam. Such a locomotive is able to draw heavy loads at a fair speed without distress to the rails, and thus it is possible to construct and work local lines with steep gradients, sharp curves, and very light rails.

The single boiler is supported on two independent frames, but coupled one to the other by a bar. Each frame is mounted upon at least two pairs of wheels, sometimes three pairs are employed, and exceptionally four; each frame carries its own moter. The boiler rests on the forward frame by a vertical pin placed almost in the center of the frame; and upon the after carriage by means of two sliding blocks. The coupling bar has for a forward turning point the bearings of the pivot upon the forward frame, and is joined to the rear frame in its center of gravity. Either one or both of the pairs of cylinders can be worked according to the work which the engine has to do. The admission of steam to the cylinders is effected by means of long flexible pipes

MM. Meyer have embodied the foregoing details: 1st, in a high-speed engine in which each frame carries two pairs of driving and two pairs of bearing wheels; 2d, in an engine made with two independent frames, each with six wheels, of which four are coupled; 3d, in a goods engine with six wheels coupled in each frame, and, 4th, in two types of engines for light lines with small traffic, the one with two sets of four-coupled wheels, the other with two sets of six wheels. These engineers built a tank-engine, with two frames with four-coupled wheels, which was submitted to various trials on the line of the Northern Railway, at the end of 1869 and the commencement of 1870. The following are the particulars of one of their engines, called "L'Avenir": the boiler is in steel, with the exception of the firebox, which is of copper. The forward pin of the underframe is of cast steel, working in brass bearings, the frame and the rods of the motions are of steel; the wheel tires are of Krupp steel. The boiler is fed by a feed-pump and an injector. There are two regulating levers and a screw reversing gear, and steam can be admitted or cut off from each pair of cylinders. The Walschaert's valve-gear is employed. The exhaust is annular Several means of braking are employed—there are a hand-brake, a steam-brake and a Le Chatelier brake. The principal dimensions are as follows:

Area of firegate	18.183 square feet
Number of tubes	200
Length of tubes	15 feet 10 1-16 inches
Total heating surface	1,678 square feet
Diameter of cylinder	13¾ inches
Stroke of cylinder	21½ inches
Diameter of wheels	4 feet 3 3-16 inches
Distance apart of wheels of each frame	9 feet 6 5-16 inches
Extreme wheel base	19 feet ⅝ inches

The first experiments that were made took place between L ens and Arras, on a line with gradients of 1 in 200. The engine drew 46 wagons, weighing 645 tons, at a speed of about 13 miles an hour. Afterwards on the line of St. Gobain, with maximum gradients of 1 in 55,

and curves with a radius of about 900 feet, this engine was in regular working for some little time. There was found no difficulty in taking the engine round 260 feet curves, and up slopes of 1 in 42. Lastly, this engine of MM. Meyer was put into service at Paris on the Northern Railway, and it furnished on the lines of Amiens, of Lerguier, and of Soissons, a duty of about 6,250 miles during the last three months of 1870. The consumption of compressed fuel per train mile was 58.8 pounds, an amount rather in excess of coal consumed by ordinary engines doing the same duty.

In their last report MM. Meyer seek to establish by calculation the influence of twelve-coupled-wheeled engines on their system in the working of railroads. On their showing, the economy in engine expenses would be 28 per cent. as compared with six-wheeled engines, and 24 per cent. as compared with eight-wheeled tank engines. These economies would allow for a reduction of the capital now required for locomotives, a reduction of staff expenses, a less consumption of fuel, and a reduction of cost in maintenance and repairs. In spite of the amount of uncertainty which surrounds calculations of this kind, it is, nevertheless, established that we can employ the powerful engines with twelve wheels; and the first tests to which the "Avenir" was submitted have encouraged the efforts of the inventors, and merits the attention of railway companies.

It must not, however, be forgotten that the problem MM. Meyer had been working out had long before been demonstrated by Mr. Fairlie, and that the results he has attained are as much more perfect as his engine is more perfect than that of MM. Meyer. If fact, these gentlemen are some years behind Mr. Fairlie, who has fully demonstrated the capabilities of the system he introduced eight years ago.—*Paris Correspondent Engineering.*

Suggestions from the Massachusetts Railroad Commissioners.

In Massachusetts the Legislature in chartering the railroad companies reserved the right to limit their charges for transportation. The following circular from the Railroad Commissioners of that State, therefore, may induce the companies to adopt a policy on their own motion to avoid compulsory legislation hereafter, if for no other reason. It is addressed to presidents and managers of the various railroad companies of the State:

SIR: The Board of Railroad Commissioners takes this occasion to suggest to you a careful revision of the freight and passenger tariffs of the railroad of which you are one of the officials, with a view to making such reductions in charges as may seem to be practicable. It is now more than seven years since the last general revision of their tariffs was made by the railroad corporations of this State. All, or nearly all, of them at that time were materially increased. With this no fault could then be probably found; not only had new taxes been imposed, in the collection of which the companies had been forced to assume the duties of tax gatherers, but the cost of everything which entered into the operation of a railroad had largely risen in price, and a somewhat corresponding rise on railroad charges was almost inevitable necessity. Within the last few years, however, the railroads have been relieved of the duty of collecting government taxes, and they have also enjoyed the advantages of a great reduction in values. The locomotive which formerly cost $30,000 now costs but $12,000; American rails, which six years ago, cost $90 per ton, now sell for between $60 and $70; foreign rails have fallen in price in the same proportion as gold; fuel, which, during the war, cost our companies $12 per ton, now costs the same companies $8; steel has fallen even more than iron, and a sensible reduction, though not so marked, perhaps, as in the instances cited, has taken place in almost every article of railroad supplies. Since the year 1860, on the other hand, the gross earnings of the railroads in Massachusetts have increased from nine to twenty-five millions of dollars annually, and their net earnings from less than three to considerably over six millions. The increase in the wealth and population of the Commonwealth during the same period has been equally gratifying, and that it should be continued is a matter of no less consequence to the railroad companies than to the people of the State.

As a result of very careful investigation during the last two years, we are strongly inclined to believe that Massachusetts is at this time susceptible of a very great and sudden industrial development. All the conditions essential to such a development have, for a series of years, been gradually and slowly accumulating; capital has been amassed, skill has been acquired, industries have taken root, machinery has been invented, and a reputation has been acquired; it only remains to take full advantage of these circumstances to secure to the people of the State a decided and lasting pre-eminence among the manufacturing communities of America. What is now needed is a stimulus, which can be furnished either by removing some existing burdens of taxation or by affording industry new and cheaper facilities. Both measures of relief rest very largely in the hands of the railroad corporations of the State, and in the result they are deeply interested.

It is a perfectly well-established fact in railroad economy that where a community is industrially in an elastic condition, ready at once to respond to any remission of burdens or improved appliances, a reduction of railroad charges within certain limit does not necessarily involve any loss of net profits to the corporations making it. The increase of business and consequent multiplication of reduced profits more than compensates for the smaller return from each transaction. So far as Massachusetts is concerned every experiment made by the railroad corporations of the State during the last few years in the direction of decreased charges, has entirely confirmed this proposition. In no case has any recent reduction led to any material loss in net profits, and in several cases such experiments have been followed by a decided increase.

It is undeniable that a knowledge of these facts, and a consciousness on the part of the community at large that the corporations have been very slow and reluctant to make even the concessions which experience has shown to be safe and reasonable, have gradually excited a very considerable feeling, both in the popular mind and in the Legislature. As sufficient evidence of this, and of the practical shape in the statute book which the feeling threatens to assume, we beg leave to refer you to a copy of the law which the Committee on Railways of the last Legislature reported under instructions, and which was defeated on its third reading in the Senate by but a single vote, and also to two reports of leading committees of the last General Court, all of which will be found appended to this communication. Both of these latter documents are so outspoken as to leave no doubt of the purpose of those who prepared them, and both of them were in many influential quarters decidedly criticised because they confined themselves to intimations as to the future, and fell short as regards immediate action.

The present is the first year in which the new form of railroad returns are to go into use, and, consequently, should any general change of railroad tariffs be made to take effect upon the first of this coming October, the results of the next year would furnish an excellent test of the effect of such change, and throw much light on the course to be pursued in future.

In approaching this revision we wish to suggest a few leading principles upon which we believe it should be based. A small uniform reduction of charges throughout a railroad tariff has been generally found to be simply equivalent to a loss of so much net profit to the company making it. To be effective, and to communicate a decided industrial impetus, a heavy and concentrated reduction, which will make itself immediately felt, is necessary. The commissioners believe that this rule is to be deduced from the experience of all countries. In making any reduction, whether in freight or fares, we would therefore suggest to you the propriety of strongly favoring certain commodities in general use along the line of your road, and, by so doing, strongly stimulate development, rather than neutralize the whole effect of any concessions you may make by dividing it among too many objects. Take, for instance, coal. This is a material not only in general use, but a primary raw material in all manufacturing industry. Cheap coal is cheap power, and cheap power is cheap manufacturing. A reduction of five per cent. throughout the charges of a tariff would scarcely produce an appreciable effect on the consumption of anything; a tariff unchanged in numerous other respects, which gave a reduction of fifty per cent. on the cost of carrying coal, would at once communicate an impetus to every branch of industry dependent on power. So also of travel. A trifling average reduction will lead to no results except diminished receipts, but a heavy reduction on fares in the neighborhood of large cities will stimulate short travel to an almost unlimited extent.

The examples given will fully illustrate the meaning we wish to convey. Our desire is to impress upon you our deep sense of the importance of effecting this change tentatively—not attempting to do everything at once and accepting results as conclusive, but concentrating relief on that point where relief is most generally needed, and where the most decided expansion may be expected to result from it. A tariff reform commenced in this way, and carried forward as fast as results will justify, would probably, within a very limited time, include every industry in the State. In effecting it the corporations would not be called upon to make any permanent sacrifice of net profits; and a public consciousness that an honest attempt, at least, at progress was being made would go very far to allay popular discontent. Of course very great judgment and an intimate acquaintance with local development is necessary to the proper initiation of any such measures as those now recommended. The directors and officials of each road should naturally be more familiar than any one else with the needs and projects of the territories they accommodate. They can, therefore, best judge as to how such a system of reductions should be commenced and carried forward. As one of the persons directly concerned in this way in the management of a railroad of the State, the commissioners would most respectfully but urgently press this subject in all its bearings upon your early attention.

As we propose in the forthcoming annual report of this board to devote considerable space to the subject of this communication, we shall, before the 1st of October next, call upon each corporation to inform us specifically what, if any, revision of its tariffs has been made, and how recently. The answers of the several companies will be incorporated into our report, that the coming Legislature may be fully and specifically informed upon this important subject. Hoping that you will judge it consistent with the interests of the company with which you are associated to effect, before that time, a thorough and careful revision of its tariffs.

We remain, etc.,

JAMES C. CONVERSE.
C. F. ADAMS, JR.

—The heaviest freight business ever done over the Boston & Albany Railroad in a single day, says the Berkshire *Eagle*, was on Monday August 7, when forty-seven trains, containing 735 cars, were received at Pittfield from the west, and 711 cars were sent east. Of these, 142 had live stock, the rest grain and merchandise. Ninety-four engines were turned at the turn-tables that day. Four years ago, in the month of July, 4,000 freight-cars passed through Pittsfield from the west; last July there were 9,000, showing an increase of about 125 per cent. in that time.

RAILROAD LAW.

Power of Towns to Subscribe for Railroad Stock—Elections and the Registry Law.

The case of *The People ex rel. The Chicago & Rock River Railroad Company vs. Frederick R. Dutcher, Supervisor, etc.*, decided recently by the Supreme Court of this State, settles some very important questions concerning elections and the registry law of this State, and is of vital importance to the managers of roads about to be constructed. The opinion was filed on May 22, 1871, and has not yet been reported.

The case was an application to the court for a writ of mandamus against the Supervisor of the Township of Amboy, to compel the subscription of $100,000 to the stock of the company of petitioners.

The following are the chief points of the decision:

1. *Election to Vote on Question of Subscription.*—That when legislation is adopted in reference to the action of an incorporate body, and no mode is prescribed in which it shall be performed, the presumption must be indulged that it is intended the body shall act through its officers and in the course usually adopted and authorized by the law governing the actions of the body.

2. *Same as Township Elections.*—That when the Legislature authorized the Township of Amboy as a corporate body to hold an election, and prescribed no mode, a majority of the court held that it was designed to authorize it to be in the manner township elections are required to be held in the election of these officers, and not under the general election laws.

3. *Registration not Required.*—That such an election is not within the registry law.

4. *Power of Towns to Impose Conditions on Subscription.*—Where the Legislature, without conditions, provides for submitting the question of subscription to the voters of a township, such electors have the power to vote to subscribe on any conditions they may see proper to annex.

Unnecessary Injury to Lands—Suit for Damages.

The charter of a railroad company provided, that "in all cases where the owners of land or stone necessary for the use and construction of said road shall refuse to relinquish the same to the corporation, or shall refuse to accept a fair compensation therefor, it shall be lawful for the corporation, by their president or any superintendent, agent, or engineer employed by them, to enter upon and take possession and use the same, avoiding in all cases unnecessary damage or injury to the owners or proprietors;" and the charter then provided the mode of the assessment and payment of the damages to the land owner. *Held*, that the damages to be assessed and paid in the mode prescribed by the charter were those resulting from a construction of the road with care, skill, and prudence, not only as to the safety of persons and property passing over the road, but also as to the protection and safety of the property-holder; and that if by reason of any want of care, skill, or prudence for the protection and safety of the land-owner, his property was unnecessarily damaged in the construction or repairing of the road, he might recover therefor in an action for damages as at common law.—(*Opinion by Gregory, J.*)—*Terre Haute & Indianapolis Railroad Co vs. McKinley.*

Of the Liability of Railroads for the Non-Delivery of Freight Beyond their Own Lines.

In the case of *The Toledo, Peoria & Warsaw Railway Company vs. Amos L. Merriman*, as yet unreported, the Supreme Court of the State of Illinois affirms the position which is now very generally taken in all the States. The following is an abstract of the facts and the opinion:

A box of goods was delivered to a railway company, marked to a point beyond their own line of road. The bill of lading given therefor was called by the company their "through freight contract," acknowledged the receipt of the goods, and proceeded thus: "Which we promise to transport over the line of this railway, to the company's freight station at its terminus, and deliver to the consignee or owner, or to such company (if the same are to be forwarded beyond the limits of this railway), whose line may be considered a part of the route to the place of destination of said goods, it being distinctly understood that the responsibility of this company as a common carrier shall cease at the station where such goods are delivered to such persons ar carrier." And among the conditions printed in the bill of lading was this: "The responsibility of this company as a common carrier, under this bill of lading, to commence on the removal of the goods from the depot on the cars of the company, and to terminate when unloaded from the cars at the place of delivery." It appeared that freight received by this company as through freight, was never unloaded or delivered at their terminus, but proceeded on to its place of destination in the cars in which it was received: *Held*, that this was a "through freight contract," and the company were liable beyond the terminus of their own road.

Railroad Directors—Their Compensation.

In the case of *The American Central Railroad Company vs. Elisha Mears*, the Supreme Court of this State has recently held as to directors "that the law does not imply a promise on the part of railroad companies to pay their directors for services as such, and to enable a director to recover for such services; a by-law, or resolution, must have been adopted by the board to compensate him therefor."

Common Carriers must strictly follow the directions of bills of lading.

In the case of *Wright vs. The Northern Central Railroad Company*, the railroad company omitted in their manifest the words, "Order Wright, Dunton & Co.," and placed upon it the name of Wellington Jones, consignee, while the directions were "Order Wright, Dunton & Co.; notify Wellington Jones, Shamokin, Pa." The District Court of Pennsylvania held that the defendants were liable for the loss incurred by the plaintiffs by such delivery.

RAILROAD GAZETTE

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.*

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Engineering and Mechanics.—Mr. M N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.

☞ *Our Prospectus and Business Notices will be found on the last page.*

MR. FAIRLIE'S LETTER.

This gentleman has again favored us and our readers with a letter on the subject with which his name has so often been associated, and on which, as our readers well know, we are unable to agree with him. We are, however, entirely ready to take the consequences of antagonism to his views on this question, and beg that he will confine his solicitude, to guard against the consequence of his own hazardous position.

What we contend for is, that if cheap roads are needed, they are to be built of the ordinary gauge and cost very little more than narrow-gauge roads of the same character, and that the advantages of uniformity of gauge, and facility of increasing the capacity of such a line, will much more than compensate for this difference.

Some of the admissions made by Mr. Fairlie in his letter, we think confirm our view of this subject.

If there is as much reduction in dead weight of cars on a narrow-gauge as he has so often stated there is, then certainly it is in itself an immense advantage. If, however, the Fairlie engine is "the essential condition "to the success of the narrow-gauge," and if without it, such a "*railroad will not pay*," then it is impossible that the dead weight is so much reduced by narrowing gauge as he says it is; because if it were, such roads would pay without the Fairlie engine

Furthermore, if it is "essential to the success of the "narrow *gauge*," then this plan of engine must either have advantages on such a road which it has not on a wide gauge, or else what is accomplished by it on the one must ensue if it is used on the other. If, for example, heavy trains can be hauled on light rails by reason of the better distribution of the weight on the driving wheels, then, unless, as we stated, they possess advantages on the narrow gauge which they have not on a wide, light rails might be used on the one just as well as on the other, so far as the engine alone is concerned. It must be remembered we are not now considering the merits of the Fairlie system of engines, but only his argument for narrow gauge, based on the premises he has chosen to select. If it should be said that such engines will draw more paying freight on a narrow gauge than on a wide one, because the cars weigh less on the one than on the other, then quite another question is introduced, and one to which we have already given enough consideration. If the advantage of the Fairlie engine on the narrow gauge is dependent upon the reduction of the dead weight of cars, then, as we have taken occasion to say frequently heretofore, the whole question rests upon that alleged fact, and if that is not true the whole reasoning is without foundation.

With reference to the weight of cars, we will only say what we have repeatedly said before, that if Mr. Fairlie, or any other narrow-gauge advocate, will furnish us with an accurate drawing in detail of a narrow-gauge box car, we will have it engraved and published. We must stipulate, however, that it must be made with sufficient accuracy so that its weight can be calculated from the drawing, and also that the average speed at which it is intended to run must be given. We have no doubt that Mr. Fairlie can build cars to run at an ordinary speed of 15 miles per hour on a narrow gauge, and have them weigh less than those which are intended to run at 30 or 35 miles on a wide, and it is also quite possible that the former might be run over the road without accident at the latter rate of speed; but that fact does not make the comparison a fair one.

In saying that in this country "no *box* cars have yet "been built which *will weigh so little and carry so much*" as those designed by Mr. Fairlie, what we had in mind when we wrote was, that such cars might be strong enough for the smooth European roads, but quite impracticable on our lines with their rough permanent way.

Mr. Fairlie speaks very approvingly of the Denver & Rio Grande passenger cars, but it is difficult to see wherein they have any advantages over ordinary cars, as they weigh 441 pounds per passenger, while the weight of some of the cars for the ordinary gauge is only 435 pounds, and their cost is in about the same proportion.

The whole question, we think, can be decided by a fair comparison of the weight of cars, and when such a comparison is made, the position of the narrow-gauge advocates will be more awkward than that of Stephenson's hypothetical "coo."

We suppose the builders of the Denver & Rio Grande Railway have satisfied themselves about the efficiency of the engines built for them by Messrs. M. Baird & Co., and if they have not, we feel sure that locomotives built by that firm will do satisfactorily the work for which they were intended. If, however, this road has "the character of narrowness," is without "*the* "*essential condition to success*," "*will not pay* unless at "an exorbitant tariff," and is equipped with engines "which are "a delusion and a snare," and "has been altogether guided by the advice" of our correspondent, all we can say is that it must be in a bad way.

RESPONSIBILITY FOR ACCIDENTS.

During the past month there has been a series of accidents on railroads and steamboats which have scarcely been surpassed in number or atrocity, and, it is to be hoped, are altogether unsurpassable in those particulars. The Westfield disaster we have already spoken of. The explosion in Mobile Bay was apparently nearly as fatal and quite as unjustifiable, and doubtless would have caused a similar excitement if it had occurred in as populous a community. The accident on the Maine Central by the breaking of a rotten bridge is to be charged to a fault in the management which was negligent either in inspections or repairs, or both; and the terrible calamity at Revere on the Eastern Railroad of Massachusetts seems directly traceable to what we must call the diabolical carelessness and disobedience of a railroad employe, who, being warned that a train was ahead of him behind time and charged to take extraordinary care to keep out of it, drove his train at full speed into the train ahead just where it was to be looked for—at a station where it stopped regularly. It is not easy to see how the company's officers could have made their orders clearer or better; the road is one of the best in the country and has a reputation for exceptionally good management; the Superintendent, Mr. Prescott, has served the company for twenty years or more with distinguished ability, and his recent appointment as General Superintendent of the Northern Pacific Railroad has been considered a very wise one; the fault of the officers, if fault there was, lay in the choice of such an employe as the engineer; but here again the testimony, so far, is that he was a sober man and heretofore reckoned careful during his term of service. If the facts reported are true, and they seem confirmed beyond doubt, the sole responsibility for the disaster lies with the engineer of the express train, who was criminally careless, criminally disobedient, and therefore deserves prosecution, conviction and punishment as a criminal—an offender against the peace of the Commonwealth, and not solely delinquent to his employers.

In such a case it is little that a corporation can do, except to furnish freely and fully the testimony in the case. The harshest punishment in its power is the dismissal of the guilty servant, which is ludicrously insufficient, and in a country like this, where labor is in demand, can scarcely be considered a punishment at all. The prompt and severe punishment of such a delinquent is more to be desired by the company he has disobeyed than by any other person or organization It will give an incitement to care and obedience such as can be secured in no other way, but is indispensable to the safe running of trains. It is hardly supposable that there are any considerable number of railroad employes who need such an incitement, but there can be no doubt that the conviction of one guilty of such gross carelessness will impress more strongly than anything else could the great weight of responsibility of locomotive engineers, conductors, and others engaged in the running of trains.

But although in this case the negligence seems so gross, it would be well for us to inquire whether other checks than mere punishment might be put upon such carelessness, and such terrible casualties prevented in spite of the criminal negligence of an employe.

And first, in this case it seems to us that the "positive" system of signals would have been likely to prevent the accident. If the engineer had in all cases to wait for a signal before passing a station, the absence of a safety signal on this occasion would of itself have been a notice to stop. However, it may be argued that a man who would run into a signal to stop (for the lamps at the rear of the local train were equivalent to that at a station) because he did not expect it and therefore did not look for it, would be quite as likely to run when he was warned to stop by the absence of such a signal. But as it would be frequently necessary to signal a stop by removing a signal under the positive system, it is probable that a constitutional predisposition to negligence would be detected under that system before the delinquent had an opportunity to demonstrate it by the massacre of a car-full of passengers.

Again, under the block system so popular in England which was described lately in these columns, a space of two or three miles would always be preserved between any two consecutive trains. No train is admitted on any signal section until it is clear of the preceding train. Under this system, we believe, accidents such as this, in which a train runs into the train ahead of it, have almost disappeared. Its adoption in this country has been retarded by its cost, but when stations are near together this cost is not great, and it is now, we believe practically in operation between New York and Philadelphia, where stations are rarely more than three or four miles apart and there is a large number of trains.

Such an accident suggests that it should be one of the first cares of a railroad officer to ascertain by all practicable tests the carefulness and accuracy of his subordinates. If no special effort is made to this end, a man may run a train safely enough for months while everything is regular and there is no occasion for extraordinary care and watchfulness, yet on the very first occasion demonstrate his unfitness for his place by sacrificing lives and limbs through carelessness. It is not every man—not every intelligent man—who is fit for such duties as train men have to perform, and it is of great importance that companies should use the utmost pains to ascertain their fitness. It will not do to prove a man in a situation where his failure to sustain the test will cause death and destruction.

The North Missouri Railroad.

On the 26th ult. the property of the North Missouri Railroad Company, including 360¾ miles of railroad, leases of 63½ miles, and all its rolling stock, machinery, etc., was sold at auction in St. Louis to satisfy the claims of the holders of the second-mortgage bonds. These bonds amount to $4,000,000 and bear 7 per cent. interest. There is also a first mortgage on the property for $6,000,000, and a third mortgage, with interest at 10 per cent. payable in stock until after 1874, and in currency at 7 per cent. thereafter, for $5,000,000, only $3,000,000 of which has been issued. The capital stock amounts to $7,500,000. Thus the total capital represented by the 361 miles of road was $20,500,000, or nearly $61,000 per mile—an excessive amount for a road of its condition and with its equipment. Its gross earnings for the last fiscal year, which ended with February last, were about $2,600,000, or about 13 per cent. The operating expenses were not reported, but the previous year they were a little more than 75 per cent. Even this would leave $650,000 to be applied to interest and dividends, and would pay the $420,000 due on the first mortgage and $230,000 of $280,000 due on the second mortgage. It is claimed, however, that the managers of the company had no de-

sire to pay this debt, but designed the change of ownership which would be effected by the sale of the road under this mortgage. There were numerous protests against the legality of the sale, and the County of St. Louis has brought suit to have the deed of trust under which the sale was made set aside as fraudulent; but we believe that there is little doubt that the sale will be held good, though perhaps there may be as little that there were gross irregularities or downright fraud in causing the issue to be made.

The purchaser of the property at this sale was Mr. Morris K. Jesup, of new York the Financial Agent of the Chicago & Alton Railroad Company, whose agent on the occasion was Adolphus Meier, Vice-President of the Kansas Pacific Railway Company. It is believed that the reorganized company will have close relations with both the Chicago & Alton and the Missouri, Kansas & Texas companies, and that it will give to the latter, and to the proposed line to Kansas City of the former, an entrance into St. Louis. That these reports have any better foundation than the fact that the road is well situated for such a purpose, we cannot say. For the most part it must be operated independently of these two companies and its chief use must continue to be in the conduct of the traffic between the country north of the Missouri River and St Louis. For this purpose it is admirably calculated. Its lines when completed will be able to drain nearly all that country, and, as we have often said before, it should be able to serve St. Louis much as the system the Chicago & Northwestern serves Chicago. If this sale shall wipe out the $7,500,000 of stock, there will remain but $9,000,000 of funded debt in addition to the $2,000,000 in cash paid at the sale to represent the value of the property. With anything like good management the road ought to pay a very large interest on the $2,000,000.

Expenditures of the Belgium State Railroads.

Below we give the expenditures during the year 1868, of the 536 miles of railroad operated by the Government of Belgium:

NATURE OF EXPENDITURE.			Percentage of total expenses.
Permanent Way.			
Officers and regular employes	$75,813 43		
Employes paid by the day or month	554,852 69		
Ties, rails, etc.—fixed material pertaining to the track	344,974 71		
Maintenance, repairs, tools, etc	172,697 28		
		$1,148,338 11	24.87
Traction and Material.			
Officers and regular employes	61,324 84		
Employes paid by the day or month	707,994 52		
Premiums for economy and regularity	19,902 00		
Fuel and other material consumed	358,603 68		
Maintenance, repairs and renewals	942,294 44		
		2,093,089 48	45.32
Transportation.			
Officers and regular employes	500,129 70		
Employes paid by the day, or month, or piece	373,659 18		
Cost of exportation	163,532 69		
Cartage	141,821 25		
Losses and damage	55,800 00		
		1,254,839 22	27.18
General Services.			
Officers and regular employes	23,089 05		
Employes paid by the day or month	14,081 81		
Material and furniture of the department	71,587 84		
Fund in aid of workmen of the department	3,720 00		
Traitments of functionaries and employes en disponibilite	3,001 07		
		115,479 77	2.5
Administration (regie).			
Officers and employes	4,805 04		
Cost of deplacement	1,263 73		
		6,068 77	0.13
Total		$4,617,815 35	

The Janus.

The Fairlie engine "Janus," built by Mr. William Mason, of Taunton, has been sent the to Lehigh Valley Railroad for trial. We hope at a future time to give some account of its performance.

—The Danville *Commercial* of August 24 says: "The Wabash River is now being surveyed and examined under the eye of an experienced United States officer, with the view of ascertaining whether it is susceptible of navigation by a system of dams and locks. The system was begun at the mouth, and has been prosecuted diligently and under such a number of tests as to make the report of the officer so clear as to enable Congress to take the matter in hand if it is favorable to the navigation. The work was begun early in May, we think, and is now far advanced, the party having now reached Covington. And thus far everything indicates that the river can be made one of the cheap and safe channels of trade. If it can, it will be of vast advantage to the people, and save to them largely in the matter of carrying heavy freights."

—The contract for the grading, masonry and bridging of the Emmetsburg Railroad has been let to Mr. Donahue, who has just completed a contract on the Western Maryland road. He has commenced grading. It will form a branch of the Western Maryland road.

MECHANICS AND ENGINEERING.

School for Steamboat Engineers.

A New York paper says: "Superintendent Spears, of the East River Ferry Company, has established a school for the engineers employed on the boats of that company. There are twenty-five engineers employed on the line. The school has a session twice each week, and after the lessons of the day are gone through with an hour or two is spent in discussing the various matters of interest in relation to the steam engines and steamboats, which any of the class have the right to bring forward. All candidates for the positions of engineers are in future compelled to undergo a strict examination. Employes of the company who wish to be promoted and advanced have the privilege of attending the school. Mr. Spears himself teaches the class; he is considered one of the most capable engineers interested in ferry-boats in New York."

British Rail Exports.

The following monthly report of exports of railway iron from Great Britain, extracted from government returns, is furnished by Heyerdahl, Schœnberg & Co., No. 31 Pine street, New York:

TO	*Month of July.*			*Seven months ending July 31.*		
	1869. *Tons.*	1870. *Tons.*	1871. *Tons.*	1869. *Tons.*	1870. *Tons.*	1871. *Tons.*
United States	35,249	41,495	42,385	203,597	238,50	287,169
Russia	35,731	26,094	7,610	122,517	140,548	54,539
Austrian Territories	2,729	4,812	3,116	19,457	24,029	8,634
British India	8,833	11,000	889	46,032	113,564	27,655
British North America	1,648	6,763	9,859	19,2 8	22,412	37,138
Egypt	1,615	....	885	5,355	1,564	1,531
Australia	1,845	22	284	14,141	5,296	10,752
Brazil	311	282	6'6	872	2,600	12,271
Holland	1,391	1,496	851	7,7 7	13,389	6,580
Spain and Canaries	910	427	790	7,603	9,457	6,358
Sweden	244	35	2,225	3,139	1,118	5,345
Chili	8	689	1,733	2,626	10,084	7,228
Spanish West India Islands	....	4	744	319	2,342	1,278
Peru	3,315	176	1,973	14,624	8,978	14,667
France	279	8	616	3,283	197	1,646
Germany	3,907	9,805	4,772	10,237	41,62	36,992
Other countries	5,846	3,555	8,893	38,905	32,872	48,694
Total	103,938	106,892	88,281	519,722	669,601	564,472
Total exports of iron and steel to all countries	273,229	257,529	312,237	1,527,543	1,738,629	1,752,432

Thus, while the total exports have fallen off more than 16 per cent., the exports to the United States have increased 20 per cent. for the first seven months of the year. The increase for the month, however, is trifling.

Morgan's Elastic Track and the English "Seaton Rail"

A correspondent compares the Morgan "patent elastic track," which was illustrated in the RAILROAD GAZETTE of July 24, with a rail somewhat similar in form which was experimented with quite extensively in England some years ago, under the name of the "Seaton Rail." Our correspondent says:

A comparison with an English rail, introduced by Mr. Seaton, which it resembles in external form and general arrangement, will show its merits in a very striking manner. The difference exists in the amount of useless iron composing the head of the Seaton rail and the angular form of the timber supporting it. In England, on the Northwestern and Great Western railways, where the heaviest description of rolling stock is used, with locomotives having driving wheels by each of which six and seven tons are supported, a 90-lb rail, of the Seaton form was used, and the result, as described by A. L. Holley in his valuable work on American and European Railway Practice, has been as follows:

"The saving in first cost, over a first-class English cross-sleeper system, with an equally heavy rail, is said to be about $500 a mile. The cost of maintenance is estimated from data which are believed to be authentic, as one-third less than that of the best cross-sleeper system. Upon examination, in 1859, after the passage of about one hundred trains a day, *for two years*, the rails showed no abrasion at the joints, while the fastenings of the rails to the joints, and of the longitudinal timbers to the ties, appeared absolutely tight and did not appear to have been *repaired or touched since the rails were first laid*. The ballast was not superior to that on several American roads. Upon removing the rails from the timbers, the creosote on the latter did not appear to have been worn at all: the rail had taken an even bearing on the whole of the timber which it covered, and had neither moved nor crushed into the wood. The screws were all tight and the joint fastenings firm. In addition to the general excellence of the longitudinal system, with this modification of it, the whol structure is so low and has so broad a base that it has no tendency to rock; for this reason it need not be deeply imbedded in the ballast and thus interfere with the drainage; not only virtual and lateral support is given to the rail by the sleeper itself in virtue of their respective shape."

The great superiority, however, of the Morgan rail, over the Seaton plan, is the economy derived by using less iron to produce the same results. Its form gives much greater strength in proportion to its weight, and the greater and more effectual support it derives from the timber, and that, while it has all the advantages of great elasticity, it will not bend "in detail."

Educating Engineers for the Navy.

Under a comparatively recent act of Congress, a class of cadet engineers will be formed at the Annapolis Naval Academy. The New York *Tribune* gives the following account of requirements for admission:

"The application must be addressed to the Secretary of the Navy, and may be made by the candidate, or by any other person for him. The names of all applicants will be placed on the registry. The fact however, that a name is registered gives no assurance of an appointment, though no preference will be given on account of priority of application in the selection of the class. But preference will be shown for proficiency, if there are more applications than appointments to be given. So that while practical information is not really a requirement, it may be of great importance to the applicant. The candidate must be between the ages of 18 and 22 years, and his application must be accompanied by evidences that his age is within the prescribed limits, and that he sustains a good moral character. Candidates who receive permission will present themselves to the Superintendent of the Naval Academy between the 15th and 25th of September for examination as to their qualifications for admission. The course of study will comprise two academic years, during which the cadets will enjoy all the privileges, receive the pay ($600), and be under the same restrictions as the Cadet Midshipmen. After graduation they will be warranted as assistant engineers. The examination previous to appointment will be on the following subjects: Arithmetic—in numeration and addition, subtraction, multiplication, and division of whole numbers, vulgar and decimal fractions, in reduction and proportion, direct and inverse, and extraction of square and cube roots; Algebra—through equations of the first degree; Geometry (Davies' Legandre), through the plane figures; Rudimentary Natural Philosophy, English Grammar, Composition, Reading, Writing and Spelling. He must be able to write from diction, in a legible hand, and spell with correctness, both orally and in writing. The candidate will also be required to exhibit a fair degree of proficiency in pencil sketching, and to produce evidences of mechanical attitude. Those who possess the greatest skill and experience in the practical knowledge of machinery, other qualifications being equal, will have precedence for admission. Candidates must also be in good physical health and without any permanent weakness or disability. The physical examination will be as precise as the mental. While at the Academy the cadets will undergo, from time to time, according to the regulations, examinations, and if found deficient at any time, or if they are dismissed for misconduct, they cannot, by law, be continued in the academy or naval service. Lastly, a cadet who voluntarily resigns his appointment will be compelled to refund the amount paid him for traveling expenses."

Goodall's Steam Brake.

An experimental trip was made with the brake on the Pacific Railroad of Missouri, between St. Louis and Allenton, on the 29th ult., which is reported as follows in the St. Louis *Republican*:

"The apparatus consists of an iron tube running beneath the cars and connected at the couplings by adjustable tubes, so that the pipe is continuous throughout the entire train. In the middle of each car is a small cylinder, with two pistons, one at each end of it, from each of which connecting rods extend to the brakes. When steam is injected into the tube from the engine, it fills it throughout the entire length instantaneously, and the steam, entering the cylinders between the two pistons, forces them apart and presses the brakes with great force against the wheels. The pressure continues until the supply of steam is shut off and the pipe is opened, when the steam escapes and the pistons are drawn back by spiral springs attached to the connecting rods. A self-acting valve in the cylinder at the same time opens and permits the water condensed from the steam to escape. The steam is supplied from the boiler by means of a pipe inserted in the top. To this there are two valves, one for opening and the other for drawing off the steam, which are operated by a lever. The engineer presses the lever slightly forward, and a valve opens, injecting steam into the tube and cylinders, and stopping the train; he pulls the handle of the lever towards him, and the valve closes, shutting off the steam, while the other valve opens and empties the cylinders and tube, relieving the pressure of the brakes from the wheels. The brake can be worked by either steam or compressed air, but the former is preferred, being instantaneous in its operation, and consequently more speedy and effectual than air in stopping a train. Like most valuable inventions, the steam brake is simple in construction and easily worked. Mr. S. M. Goodall, the inventor, with Messrs. A. W. Mitchell and Jas. O. Carson, who also are interested in the patent, explained the manner in which the brake was worked.

"The first experiment was tried at Meramec, where the train stopped while going at the rate of forty-five miles an hour, in thirty-three seconds, and in a distance of 1,050 feet. The train was backed up to Allenton and the hand brakes were tested. The brakemen were all in their places, and when the whistle sounded brakes down, they at once applied the hand-brakes, while the train was going at a speed of thirty-eight miles an hour, and stopped it in thirty-seven seconds in 1,290 feet. The severest test was applied at Oaklands, where the train, while running at the rate of forty miles an hour, on a down grade of forty feet to the mile, was stopped in thirty-six seconds, and in a distance of 1,733 feet. The gentlemen superintending these experiments were Col. J. B. Moulton, City Engineer, and Mr. Louis Nickerson, Civil Engineer, of St. Louis."

The Keystone Bridge Company.

The General Western Agent of this company, Mr. Walter Katte, has removed his office from Chicago to the northwest corner of Main and Green streets, St. Louis, as the superintendence of the superstructure of the great St. Louis Bridge requires his presence in that city nearly all the time.

—The Atchison *Champion* says that Mr. W. F. Downs, Superintendent of the Central Branch Union Pacific road, has rented a pew in a church at Waterville, Kansas, for the accommodation of the employes of the road at that place. Major Downs also lately provided each of his section foremen and roadway operating employes with a copy of the "Roadmaster's Assistant and Section Master's Guide."

Contributions.

NARROW-GAUGE RAILWAYS.

To the Editor of the Railroad Gazette:

For some time past I have observed, with much regret, that you have committed yourself to a hopeless contest against the system of narrow-gauge.

I say with much regret, because it is natural to mourn over powers wasted and talents misapplied. Moreover, your journal is in other respects so ably conducted, and its contents are so well selected, that it must necessarily possess a large circulation, and enjoy a considerable influence. Many railroad men, fully occupied with their daily duties, will be guided by your opinions, and will expect you to solve correctly for them a problem which they have not leisure, or possibly not inclination, seriously to grapple with for themselves. Your present course may therefore retard reform, but can retard it only for a short period, and at the cost of eventual loss of influence to yourself. The forces against you are gigantic; the struggle in which you are engaged is unequal; the issue cannot be for one moment doubtful. With your permission I will relate a true story, which is, perhaps, less known in America than in England:

When George Stephenson was engaged in laying the foundations of the railway system, he was examined before a committee of the House of Lords. A member of this committee, a nobleman, who thought the projects before him utter nonsense, put this question to the projector:

"Let us suppose, Mr. Stephenson, that this railroad of which you speak was actually constructed and at work, and that by some accident, such as a broken fence, or an open gate, cattle chanced to stray upon the track, and that the train came in contact with some animal, such as a cow, would not that be very awkward?"

Stephenson considered for a moment, and then said, in his broad dialect:

"It 'ud be vara aukard *for the coo!*"

The same evening, relating the circumstance to his family, he added the pithy commentary, "An so, *that* lad wor shunted!"

In like manner, sir, the inevitable growth of the narrow-gauge system will be "vara aukard" for the Railroad Gazette, if it should maintain its present attitude. Horns down, and tail erect, would have helped the poor cow but little; but I hope that your opposition will be "shunted," in time to escape the collision that must otherwise be both unavoidable and fatal.

The article in your issue for Saturday, the 8th of July, seems to me to be so extremely one-sided and to contain so much that is incorrect that I am bound, as one of the promoters of the narrow gauge, to offer a few remarks upon the subject. I may state that my reply to Mr. Rice's paper, which I trust you have been good enough to publish, nearly if not wholly upsets all your arguments; and the facts therein brought forward, which I will not now repeat, prove most unquestionably the soundness of the views I have constantly expressed on the question of gauge. The opposition which I have to encounter is indeed little more than an illustration of the old proverb that "none are so blind as those who won't see.

Time will not allow me to discuss with you at the present moment all the circumstances which contribute to and render necessary the enormous difference that exists, and always must exist, between the conditions of traction upon broad and upon narrow gauge. I am now at work upon a paper which will be read next week before the British Association at Edinburgh (and a copy of which I shall have the pleasure to send you for publication), in which I enter fully into some of these circumstances, and endeavor to explain the reason of the difference between the relative proportions of dead and of paying weight upon the two gauges, and the enormous and inevitable preponderance of dead weight in the trains run upon broad-gauge lines. I have also in preparation, and hope to publish before the end of the present year, a volume containing a more complete and comprehensive account of all parts of the subject. At present, therefore, I trust you will hold me excused if I only touch lightly upon those points which are most prominent at this particular conjuncture; and among these I will give the first place to

NARROW-GAUGE CARS.

It does not follow, because in your country no box cars have yet been built "which weigh so little and "carry so much," that they should not have been built elsewhere. You fall into grievous error when you italicize the words quoted above, as if to imply that cars of the weights and dimensions that I have given have no existence save in my own imagination. The box cars, as you call them, now running on the Novgorod narrow-gauge railway near St. Petersburg weigh 2 tons 13 cwt., and carry over 10 tons at 75 cubic feet to each ton.

The box cars on the Imperial Livny Railway also weigh 2 tons 13 cwt., and carry 7 tons at 75 cubic feet to each ton; and the mere citation of these facts sufficiently disposes of your remarks upon this particular head. Indeed, I have practically demonstrated upon the Livny Railway the absolute truth of every sentence about the capacity and economy of the narrow gauge that is contained in my paper of last year, upon which, for some unknown reason, you made so fierce an attack. As regards the broad-gauge lines, the incidents of their daily working sufficiently prove my case.

COAL TRAFFIC.

Coal is transported in this country in 4-wheeled cars (we have no bogie cars) often at speeds of 45 miles an hour; and I know that coal trains in your country do not exceed that rate, even if they attain to it. The ordinary speed of the Festiniog Railway trains is 15 miles per hour. But I have frequently taken trains over it at 30 and 35 miles an hour; and the carriages, which weigh only 30 cwt., run perfectly steady at this speed; in fact more steadily than on any one of the best broad-gauge lines. The Imperial Russian, and other commissions, have testified that such is the fact.

DENVER & RIO GRANDE RAILWAY.

The passenger cars of the Denver & Rio Grande Company, as you describe them, seem to me to be altogether first-rate. A height of 7 feet 9 inches is ample for any purpose. In this country we have no carriages exceeding 6 feet 9 inches in the center. Those used on the 7-feet gauge are 6 inches less than this; and a very great number of carriages are under 6 feet. If, then, the Denver Company can give a foot more in height than the best stock in this country, I can only say that the locality thus served is served exceptionally well; and that a community that objects to such stock does not deserve to have a railroad at all.

It will be found, on examination, that the Denver cars are no wider in proportion to the gauge than your palace and sleeping cars in ordinary use. If these run safely, although they are 2½ times the width of the gauge, why should not the Denver cars do the same? Of what importance is the *average* width of the rolling stock? So long as it is proved that a certain extreme width is run safely on your principal lines, and at your greatest speeds, and that with this stock a good angle of stability is maintained, there is nothing else that has any practical bearing upon the matter under consideration.

Your observations on the locomotive part of the question are entirely correct. It has been proved by repeated trials, both in this and other countries, that *the cost of hauling will be reduced in proportion as the power to haul is increased.* Engines of the common type, but diminished in size to fit a 3-feet gauge, will be so costly and so nearly useless that they will convert a railway into a caricature or a sham. If the Denver Company insists upon working their line with the types of engines described in a letter in the New York *Tribune* of the 11th of July, 1871, signed "S.," it would have been better for the interests of the narrow gauge if that railway and its authors had never come into existence.

The point for which I contend, which I have always maintained, and at last have been enabled experimentally to prove, is that a 3-foot gauge can be made capable of taking the place of the best broad-gauge line in existence. Unless this fact is constantly borne in mind, and the line worked with reference to it, the stockholders will come to inevitable grief, and the existence of the narrow gauge will be a matter to be deplored. In other words, if we consider a narrow-gauge line to be a sort of railway on a small scale, fit to be worked with small engines and having only a small capacity for traffic, then we shall have enormous expenditure and no returns. But as soon as we realize that it wants only engine power in order to do whatever can be done on a broad gauge, and to do this more profitably, we enter at once upon a highly remunerative undertaking. When General Palmer, Captain Schuyler, and other members of the Denver Company directorate called upon me here for information, I gave it freely; and to my great satisfaction, after many interviews, persuaded them to abandon the 2-feet 6-inch gauge which they had at first decided upon, and to substitute for it the Fairlie gauge of 3-feet. They did this only after much consideration, and they also accepted my reasons for the employment of the light four-wheeled stock of which I handed them full particulars. But though I succeeded in inducing them to accept my gauge and my views of rolling stock, I altogether failed in persuading them to adopt the only means by which the narrow gauge can be lifted out of its character of narrowness, and raised to perfect equality with the widest railroad in existence. I need hardly say that I allude to the Fairlie engine, *which is the essential condition of the success of the narrow gauge.* Until it is adopted by the Denver Company their *railroad will not pay*, unless at an exorbitant tariff.

FOUR-WHEELED CARS.

Your observations upon the difference between cars with only four wheels and those with eight on your truck system, are very true and to the point; and they furnish, I am sure without intention on your part, a strong argument in favor of the wheel-base of the Fairlie double-bogie engine. While, however, I maintain this principle for the engine, where every pound weight of the machine, together with its store of fuel and water, is made to increase its power, I do not recommend bogie stock for wagons, because this style of construction necessitates an excess of dead over-paying weight. It was only after fully demonstrating this to the Denver authorities, and after much discussion, that I convinced them of the soundness of my arguments.

In respect, therefore, both of gauge and of rolling-stock (exclusive of a form of engine which they will find to be a delusion and a snare), these gentlemen have been altogether guided by my advice. When the time comes at which they determine to make their line other than a farce, they will place the Fairlie engine upon the Fairlie gauge. This done, the Rio Grande Railroad will not only be second to none in America, but it will be superior to all others. It will accommodate a heavier traffic than any other existing line of whatever gauge, and will do this at a smaller cost than that at which any other line can be worked. I desire to repeat here, in the plainest and strongest words I can use, that the 3-feet gauge is that which will give the maximum of results in carrying any traffic, whether large or small, at a maximum speed of 35 miles an hour. It will also give the minimum of cost, alike in construction and in working; and if only properly handled, it must at no distant time become the standard gauge of the United States, and must absorb into it that of all the others; competition will compel this result.

A 3-feet gauge railway, laid down side by side of one of your present great lines, such as the New York Central, the Erie, or any other, and worked on right principles, would at once take away from its neighbor the whole of the traffic, except the conveyance of those passengers who insist upon what they do not at present ge', namely, a higher average speed than 35 miles an hour. It would do this; it could transport a larger paying load in a shorter time than its rival, and at much lower rates, while the profit of its work to the stockholders would still be considerably greater. I conclude, therefore, that the summing up of your article is radically wrong, both as regards inferences and facts; and I repeat that the Fairlie engine on a 3-feet gauge secures the highest working capacities, and the smallest working expenditures that are attainable under present conditions of railroad traffic. The smaller cost of construction, being admitted on all sides, it does not need to be demonstrated.

Robt. F. Fairlie.

No. 9 Victoria Chambers,
Westminster, London, 2d August, 1871.

COMPLEXITY VS. SIMPLICITY.

A Trial Wherein the Two are Roughly Rubbed Together.

To the Editor of the Railroad Gazette:

When Edward Bates was a young man, and in the days when "stumping" was a reality and not a fiction, he, on one occasion, met an adversary who professed himself deeply in love with a simple government, meaning, perhaps, a plain and economical one. Mr. Bates, in reply, said something like this:

"The gentleman tells us that he is in favor of a 'simple government.' I, citizens, am in favor of a complex one. For a simple government is one of unity of power, compacted and made harsh, and however beautiful it may be within itself, to all outside, to whatever it comes in contact with, it is devastating. Not only so, but by the concentrated character of its impinging action it causes recoil against itself, which eventually leads to its own destruction.

"Yes, I am in favor of a 'complex government,' a government of balanced parts, in which skillfully-placed springs soothe the asperities of opposing bodies, where each part is assimilated to each other, and takes up the motion which its fellow has laid down, in the proper and appointed time and manner, so that it may be passed on smoothly, without jar or impediment, and whose action upon such objects as it comes in contact with is so yielding that the recoil is not destructive, but only exhilerating."

Neither you nor I will perhaps differ from the definition of complexity, which forms the threads upon which these ideas are strung, especially when coming from such a source. But, indeed, you are mistaken in supposing that I have criticized your meaning of the word as a word. My meaning was only of mechanical practice, not of verbal refinement. I only spoke against the *too general* use of sweeping arguments and arbitrary words in an absolute sense, when all our true knowledge must necessarily be the result of relative comparisons. Any other apparent meaning was from inadvertence of expression.

These words, "simplicity" and "complexity" received their mechanical meaning in the olden time, when the highest of mechanical trades was weaving, and when the weaver who could manage a more intricate figure than a square was, in part at least, an artist of repute. The looms, too, were necessarily—from the culture of the people—simple; for all the brain in all Europe could not have compassed a Jacquard. In those days complicity was a mental and mechanical impossibility from which the mind recoiled. With the wisdom of our masters, we have gathered, clinging to it, some of their weaknesses; and to this day we look upon complexity with the same loathing with which we abhor a snake, whilst simplicity takes to us the similitude of a gentle dove bearing ease and comfort as an olive branch in its beak.

But you have yourself, in better words and much greater knowledge of the facts than I possessed, given the real effect of the word complex when you say, "on "this side of the Atlantic what we call its great com- "plication has been almost universally considered the "great objection to its use. If, after a reasonable "amount of experience, it should be found that this "opinion, or rather expectation, was a mistaken one, "we will be the first to withdraw and openly admit it. "That this opinion is extensively held, the fact that "the Janus is still unsold after it has been completed "about eighteen months is probably sufficient evidence, "although it by no means follows therefrom that the "opinion is correct, as majorities are often wrong."

Now you will, no more than myself, I am sure, be satisfied that all reasoning, all trial, should be set aside, and our choice of machinery for future use be fixed by a prejudicial word. Yet in this case, an engine which has received the encomiums of those who for four years have used it, and who have continued to replace their stock with it, has been brought to this country at the expense of one engineer, has been advocated by the single feeble voice of one other—so far as I know—is undebated, untried, scarce examined, but simply disregarded, from the potency of the single word "complex." As well would it be to condemn it on religious grounds because it has been named "Janus."

Let us for a moment enter into the workshop of Nature, and learn how the first, the Great Mechanic, has wrought His work.

Behold the mollusca! We see it but a well filled sack. Yet of this sack and in it are diverse cells having different forms and functions, and so numerous that the number within the space of the one-hundredth part of an inch becomes a theme for wonder. Remove but one, and you produce a disease which only replacement can cure. Within these cells are *nuclei*, a mystery to man, and beyond these again, *nucleoli*, mysteries of mystery; and beyond these we cannot say—the microscope reveals no more to mortal. View the articulates, whose work it is to crawl from leaf to leaf, to feed, to propagate, and to die. They appear to our sight like a chain of mollusks; but we find that there are common canals and ganglions, and, as it seems, a common brain, if such could be called a brain which apparently gives no more intelligence than a galvanic battery might do. Test the creature's power: the ratio will be found as an hundred times that of the power of man. Yet its life is brief: it goes out with the summer. Let us rise to the consideration of the vertebrata. Here we have all that we had before, but more complex and more highly developed, and with many additions which have been taken on as the condition of life rose. Here greater complexity led to greater perfection. Ganglions become nervous systems, of which it may be said that if the whole world were interlaced with telegraphs and each house contained a battery in full use, it would not equal their complexity one in a thousand, and could not compare in certainty and regularity of action. Mere pulp grows into muscle, complexing as it grows, and from a single cartilage proceeds a bony skeleton, cellular like the rest, the parts of which, with the parts of those things mentioned before, are so numerous as to form, in their names, modes of distribution and use, the most abtruse branch of a most learned profession. These last more complex last longer than the others, the terms of their life being from five to a hundred years.

Above all rises man with a brain more convoluted, more divided, more complicated, so that he may stand erect, and think, and control. Are you satisfied with this arrangement of the "shop," or do you glory in the simplicity of the mollusk? Would you pattern man after his fashion, or would you be more simple still and make him in one piece—cast him of a homogeneous material, and bid him walk? Alas, for simplicity! your simple creature could only grind himself to powder in the first effort.

It is said by those of the Orient, "May your shadow never be less;" but I say unto you, "May your complexity never decrease," lest in striding over an obstacle the editoral head be thrown from the editorial shoulders, and the GAZETTE languish under degenerate succession.

Furthermore, I call your attention to the farmers' seed sack and the modern "planter," the forked stick and the "cultivator," the sickle and the "reaper," the flail and the "thresher," and, within your own ken, to Franklin's simple press, which could compass nearly 300 copies per hour, and the press of the London *Times*, with its revolving cylinders, its endless tapes, its automatic machinery of many kinds—which is confined to 10,000 or 12,000 copies per hour by the inability of human hands to feed it; and to whatsoever else—scattered all round—there needs to prove that as man rises in the scale of intelligence his useful servants become more complex, more perfect, and his hours of labor become less.

What if this be the true principle of design, that it requires complexity of detail to produce harmony of effect? What if we have trammeled ourselves with the proverbs of our ancestors and have lost years of forward advance by clinging to their superstitious use of words? For the simplicity of 1200 is but coarseness in 1600, and the complexity of 1600 the pas time of 1800. Let us at least think of it; for the principles of design are as well worthy of debate as the construction of detail, and so, casting a retrospective glance at the past, let us clear our eyes and minds for the future. This is not to seek after complexity, but to work truly for the effect, not fearing that our work may be called "complex." So we may remember that an atom, the most simple of earthly things, is, uncombined, the most useless; that as the combination grows nobler in its means and ends, it also grows more complex, but never degenerates into mere multiplicity of parts, which would not suffer from removal or replacement.

It was natural and without blame that you somewhat exaggerate the details of the Fairlie engine. I had at first the same ideas; but an old invention of my own, towards the same end, reoccurred to me before I had seen one, and I therefrom recognized that the vertical center line of the truck is a fixed line for truck and boiler. Thus you may arrange your link-gear, or any other motion, without universal joints, and, as they are duplicated, dispense with counter-weights and springs. The flexible pipe and injectors are not so complicated as the rigid pipe and pumps, and from the proximity of the water, or other cause, the injector on the Fairlie seems to require no assistance. Besides, we may remember that the steam could be taken from the center-pin without a flexible pipe, but that experience has proved flexibility in the steam-pipe to be a gain and not a loss. This reminds me that long ago a very intelligent mechanic complained to me that flexible steam pipes could never do, since rigid ones were among the most wearing parts of a locomotive, and this with doubtless as clear a comprehension as I had, that the originally circular boiler became, in motion, a thousand ellipses, with a thousand differently directed axes, in as many moments. I said then, and continue to think, that perhaps a more flexible steam-pipe, even upon our ordinary locomotive, might be no detriment.

There are two engines and two tracks, but if by the balance introduced the hammering should mainly cease, the durability and freedom from wear will, I think, increase rather than diminish, and very greatly.

Your reasoning in regard to grades was good and clear, but you have not understood me as I wished to be understood. You assume that I claim an absolutely perfect gain. But there is nothing absolute under the sun: all is relative. It is evident enough that to get the full advantage of the arrangement, the grades should be mathematically correct in consecutiveness; that to get 772 lbs. feet from steam would require a perfect engine and boiler; that to get the theoretic expansive curve from the cut-off would require impossible conditions. But I firmly think that steam with its imperfections is yet quite useful; that expansion has a gain beyond the following up of the piston from center to center; and that increasing the adhesion as you mount a grade is an advantage, though we may not be able from outside causes to derive a perfect benefit. We will not locate the road for the engine—although that might be in some cases serviceable—but we will take the majority of roads as they now stand completed, and pin our faith there, until fairly, by argument or trial, convinced to the contrary of our opinion.

The greater adhesion might at least have this effect, that it will save the detrimental "run at the hill."

I have no right to answer for Mr. Mason, but continue to think that power for power, the price of the ordinary and Fairlie engines would be nearly equal.

Again hoping earnestly that "your complexity may never decrease"—the kindest wish I can think of—I remain yours, truly,

LOUIS NICKERSON,
Civil Engineer.

ST. LOUIS.

MISCELLANEOUS.

—A New York paper says: "A child was rescued from death in a remarkable manner, on Thursday, by a fireman on the Mount Holly Railroad, near Merchantville. The train was going at full speed, when the engineer saw, far ahead, a child running along the track. He reversed the engine and whistled down brakes, but the grade being very steep it was found impossible to stop the train. In the meantime, the fireman, Lewis Ehertson, seeing the child's peril and the utter impossibility of stopping the train, ran out to the front of the locomotive, and, standing upon the cow-catcher, caught the child in his arms just as the locomotive touched her garments, and lifted her safely out of danger."

—The manœuvres of the Russian troops will be on a grander scale than usual this year. A novel feature will be the construction of a railroad by soldiers who have been trained for this purpose. In 1869 a number of troops were sent to the different railroads for instruction, with a view to the ulterior formation of companies capable of building, destroying, or managing railroads in time of war. During the coming evolutions these men will lay down rails to connect the Peterhoff and Warsaw lines. The distance is a little over five miles, and the work must be completed in ten days, so that the line can be made use of for the transport of troops during the last four or five days of the manœuvres.

—Last week, in the Morgan County (Ill.) Circuit Court, the Jacksonville Depot Building Company obtained a verdict against the Toledo, Wabash & Western Railway Company of $28,600. The Depot Company some time since built a large depot, and rented a part of the structure to the railroad for a passenger station, on condition that all trains be stopped twenty minutes for meals. This condition was not complied with by the railroad; hence the verdict.

—The directors of the American Steamship Company, of Philadelphia, have awarded the contract for building four iron screw propeller steamships for the line between Philadelphia and Liverpool to the shipbuilding firm of William Cramp & Sons, of that city, for the sum of $520,000 for each vessel, or $2,080,000 in all. The first steamer is to be completed within twelve months, and the fourth within sixteen months. The engines are to be of the latest English models; each vessel is to be of 3,000 tons, and to be built of the best materials, for the purpose of competing in capacity and speed with the best steamers afloat. The award of the contract is a sufficient answer to the disparaging statements lately put forth by envious New Yorkers, and justifies the prediction of the friends of the line.

—A Washington telegram says: "It is reported in Washington that Col. Thomas A. Scott has concluded negotiations with Harper's Ferry Water Power and Manufacturing Company for their property, recently purchased of the government, at Harper's Ferry. This is a movement in railroad strategy of great importance, as it will give the Pennsylvania combination possession of a point through which it can secure a much shorter route between Washington and the West than that now being constructed by the Baltimore & Ohio Company. It is intimated that the object is to extend the road from Hagerstown, in Maryland, to Martinsburg, in Berkeley County, West Virginia, and thence down the Potomac to Harper's Ferry, and thence across the Shenandoah to Edwards' Ferry, where it will form a junction with the Washington & Ohio road."

—A certificate of incorporation of the "Southern Indiana Car and Machine Company" was filed with the Secretary of the State of Indiana on the 28th inst. The company is organized for the purpose of manufacturing and constructing railroad cars and other machinery at the town of Clarksville, or Ohio Falls, Clark County. The capital stock is $500,000, and the time of existence twenty-five years. A. B. Semple, Chas. S. Millard, H. Burkhardt, and John G. Barrett are of a board of seven directors to manage the business for one year.

—A corporation in Washington Territory known as the "Walla Walla & Columbia River Railroad Company" offers, in consideration of a subscription of $300 000 from Walla Walla County, to secure that amount by a first mortgage on the road and rolling stock, to give the whole profits on down freights for twenty years, unless their profits exceed the amount necessary to pay principal and interest, and to give the commissioners of that county authority to establish rates on down freights.

—Mr. Phineas Barnes, of Portland, Me., a lawyer of rare ability and culture, and for many years solicitor of the Grand Trunk Railway Company in Maine, died on the 21st ult., after a protracted illness.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—William E. Smith has been appointed Master Mechanic of the North Missouri Railroad shops at Moberly, Mo.

—C. F. Jauriet, who has heretofore had the title of "General Master Mechanic" of the Chicago, Burlington & Quincy Railroad, assumed the office and title of "Superintendent of Machinery" on the 1st inst., at the same time he was relieved from duty as Master Mechanic of the company's shops at Aurora, and E. T. Prindle, who has long filled the position of foreman of the locomotive shops, takes that place. Mr. Jauriet has served the company ably and faithfully for many years, and his promotion to a position where he can really supervise the motive power of the company and not have his time absorbed by attending to details in the execution of the work is well deserved and likely to profit the company. Mr. Prindle is a most excellent mechanic, who has the good will of his subordinates and will be able to manage the very large force under his command at once effectively and agreeably. There are few better shops or better forces in America than those of which he has charge.

—The Topeka, Cottonwood & Walnut Valley Railroad Company was organized in Topeka, Kansas, on the 15th of August, to build a road, as is announced, from Topeka southwestward through Shawnee, Osage, Lyon, Chase, Butler and Cowley counties. This would indicate a route parallel with and very near to the Atchison, Topeka & Santa Fe road throughout most of its length in Kansas. The directors are E. W. Dennis, C. K. Holliday, T. J. Anderson, John Guthrie, Joel Huntoon, Wallace McGrath, F. P. Baker, T. H. Walker and John Brown, of Shawnee County; R. W. Randall, of Lyon County; S. N. Wood, of Chase County; C. B. Lambden, of Butler County, and H. B. Norton of Cowley County.

—The following are the directors and officers of the newly organized Memphis & Vicksburg Railroad Company, which hopes to execute a plan designed before the war for a railroad for the most part through the fertile Yazoo Valley, where the country, once cleared, could produce probably more than the total actual productions of Mississippi at present: Gen. Wirt Adams, President; John A. Klein, Treasurer; J. R. Chalmers, Attorney; John Willis, J. W. Vick, A. J. Phelps, A. M. Waddill, J. L. Alcorn, P. B. Stark and J. M. Manning.

—Geo. M. Miller has been elected President, and John T. Bush Treasurer of the Newport & Wickford Railroad and Steamboat Company.

—On the 28th ult. Gen. Lewis B. Parsons, of St. Louis, was elected President of the North Missouri Railroad Company, *vice* Barton Bates.

—John Donnelly, late Manager of the Atlantic & Pacific Telegraph office at Ogden, Utah, has been appointed Assistant Superintendent of the Union Pacific Company, on its Western Division, from Cheyenne to Ogden.

—The officers of the Nashville & Chattanooga Railroad Company were all re-elected on the 16th ult. They are: E. W. Cole, President; W. A. Gleanes, Secretary and Treasurer; J. W. Thomas, General Superintendent; N. C. Morris, Resident Engineer; R. C. Bransford, General Book-keeper.

—W. B. Brinsmade, for many years Superintendent of the Connecticut River Railroad, has been employed by the Connecticut Western Company to take charge of its works.

TRAFFIC AND EARNINGS.

—The traffic receipts of the Great Western of Canada for the week ending August 4, amounted to £17,631, against £15,735 in the corresponding week of last year, showing an increase of £1,896, or 12 per cent.

—The traffic receipts of the Grand Trunk of Canada, for the week ending August 5, amounted to £34,200, against £30,500 in the corresponding week of last year, showing an increase of £3,700, about 11 per cent.

—The recent arrival at Philadelphia of a cargo of 880 quarters of fresh beef from Texas has created quite a sensation in that city. Directly after the arrival of the vessel the hatches that had remained sealed from the moment the vessel left Texas were opened, and the uppermost quarter was lifted out for inspection and found to be as fresh and sweet as when it was packed away. By an arrangement of a huge ice-box in the after part of the vessel, and a huge fan, a current of air was kept continually passing over and permeating between the layers of beeves, and they maintained thus an average temperature of 36 degrees. Five hundred pounds of a dainty fish, caught in the Gulf of Mexico, were found to be as firm and perfect as when placed in the refrigerator. When it became known that fresh Texas beef was being sold at 10 cents a pound, half the rates charged in the street market, a great rush of people was at once made to take advantage of the rare opportunity. The captain of the vessel at once transformed a portion of the fore deck into a well appointed meat stand, and secured a corps of carvers, who are now, and have been since this temporary meat shop was opened, industriously engaged in attending to the hosts of customers constantly pressing forward for the cheap Texas beef. The scene was an interesting one. Rich and poor crowded forward to be served, calling for quantities from a pound to a quarter, and while waiting were prolific in their ecomiums upon its good quality and its cheapness, and their riddance from the "butcher monopoly" which they have been compelled to support for so long a time. The new enterprise bids fair to give a decided impetus to stock raising in Texas, and the time is likely not far distant when semi-weekly vessels will arrive loaded with fresh beef from that section. The experiment has been tried at a season of the year during which its success might have been reasonably doubted.—*Exchange.*

CHICAGO RAILROAD NEWS.

Chicago, Burlington & Quincy.

This company has lately completed at its shops in Aurora a new locomotive, which is numbered 139, to take the place of one retired from service.

Grain is coming in quite rapidly on this and other railroads.

It is intended to have the second track completed between Chicago and Aurora this fall. It now extends as far west as Downer's Grove. The additional business coming in at Aurora from the new Streator Branch and the Chicago & Iowa road, and at Mendota from the Prophetstown Branch, makes this second track on a part of the line, always crowded, almost indispensable.

To Baltimore.

A train of ten or twelve Pullman Palace cars, made up for the National Masonic Convention to be held at Baltimore on the 19th, will leave Chicago on Sunday afternoon, the 17th inst., and will be one of the most imposing and well-appointed trains ever run between this city and the seaboard. It will go *via* Fort Wayne and Pittsburgh.

The New Steamer of the Goodrich Line.

The following description of the "Muskegon," a new steamboat just completed for the Goodrich Transportation Company, is taken from the Chicago *Evening Post:*

"This vessel, which is to run between this city, Muskegon, and Grand Haven, is 214½ feet in length over all, 29½ feet beam, and 49 feet width over all. The main deck is occupied by the ladies' cabin, clerk's and steward's offices, lamp and baggage-room, and the usual space for storing goods for transportation. The ladies' cabin is elegantly fitted up. Heavy Brussels carpets cover the floor. Black walnut furniture, richly upholstered, is plentiful. The state-rooms are models of convenience and comfort, and a wash-room and water-closet are near by. They are heated, as is the case all over the boat, with steam heaters, covered with heavy marble slabs.

"The main entrance to the gentlemen's cabin is from the center of the boat, by a broad stairway. The sides are finished in polished pine and black walnut. The after-saloon or cabin is seventy-seven feet in length and fifteen feet wide. Elegant pier mirrors with marble stands and silver guards occupy either end. A heavy body Brussels carpet of elegant design is upon the floor, and black walnut furniture, richly engraved, inlaid with gold and upholstered in French moquette, affords accommodations for the passengers. Large bronze chandeliers hang from the ceilings. The pilasters each side of the state-rooms are surmounted with gilt caps, and two rows of gilt wire run along each side above them. The sky-lights are enameled glass, and in the stern light the words "Goodrich Line" are ground. There are three grand rooms aft the wheel on each side—a double and single room. The double room may be used for families or parties of gentlemen or ladies. There are fifty-five state-rooms, each having two berths.

"The dining-room is 60x15 feet in dimensions. The forward end is circular, and contains several windows, so that a thorough circulation may be obtained. The floor has a tapestry Brussels carpet upon it, and the room is furnished with cushioned oak arm chairs. The washing and smoking room is unusually large, its dimensions being 10x36 feet. Black walnut and ash settees occupy either side. At one end is the marble-top wash-stand. It is finished in ash and black walnut. The room is ventilated by three windows. Underneath this apartment is the gentlemen's closet

"In the texas are apartments for the captain, mates and wheelsmen. Network and railing ornament the hurricane deck, and an awning is stretched over the promenade deck forward, and over each quarter deck aft. The lamp room is completely enclosed in iron, so that should an explosion or accident occur, the boat could not be ignited. The engine is 42-inch cylinder and 10-feet stroke. The boiler is low pressure, and 10 feet in diameter and 21 feet long.

"The colors of the boat were presented by the citizens of Muskegon, and are the finest on the lakes. A perfect system of hose and water-pipes protect the vessel in case of fire. The Muskegon was built at Manitowoc by G. S. Rand, and furnished and finished by G. Hurson, agent of the company at Milwaukee.

"The officers of the steamer are C. E. Kirtland, Captain; —— Torrence, First Engineer; Warren Dorrer, Clerk; J. McBride, First Mate, and G. Watson, Steward."

Chicago & Alton.

The completion of the bridge over the Illinois River at Whitehall has been seriously delayed by sickness among the employes; the ague prevailing very generally in that locality. The bridge was to have been ready for the passage of trains by the first of September. The earnings of the company for each of the first three weeks in August were:

	1st week.	*2d week.*	*3d week.*
1871.....	$124,425 71	$136,723 12	$136,844 98
1870.....	115,702 56	130,661 59	126,399 98
Increase..	$8,823 15	$61 53	$10,445 00

Showing an increase of 7⅔ per cent. in the first week and 8 per cent. in the third week's earnings.

Chicago & Southwestern.

On Thursday of this week—the 31st of August—the last rails were laid near Cameron, Missouri, making the road complete from Washington, Ia., to Leavenworth, Kansas—a distance of 268½ miles. The Chicago, Rock Island & Pacific Company, which now operates 169 miles of the road, to Trenton, Mo., will probably take charge of the entire line about the 1st of October. The distance by this route from Chicago to Leavenworth, is 528 miles.

The line of the Atchison Branch, from Plattsburgh to Atchison, has been located, and the company are now negotiating a contract with Messrs. Dolman & Co. for its construction.

Chicago & Northwestern.

This company has let to Fox & Howard, of Chicago, the contract for the construction of twenty miles more of the Madison Extension or "Baraboo Air Line," from Reedsburg to Wonewoc. This will bring the road to the point where the branch northward to Tomah will intersect it. The same firm has taken the contract for the construction of a viaduct over the line of the Wisconsin Division at Erie street, in this city.

Concerning the Menominee Extension, from Fort Howard northward, the Green Bay *Advocate* says: "There are now about 1,200 men at work on the line between this city (Fort Howard) and Peshtigo, and men are fast coming in, and all are given employment that apply. It is expected that by Saturday night there will be upwards of 1,500 men at work on the road. Camps have been established about one mile apart, and large forces of men are at work north from Oconto and south from Peshtigo. The road is already completed and construction trains running beyond Duck Creek, and, as the heavier work is now done, the contractors expect to be able to lay one-half a mile of iron per day until the road is completed to Menominee."

Chicago, Danville & Vincennes.

The road is this week completed to within 18 miles of Danville, about 10 miles south of the Vermillion County line. By the first of October it is expected to have the rails laid to Danville, where it will be met by the Evansville, Terre Haute & Chicago road, which is now in operation from Terre Haute northward, in Indiana, to Perrysville, within 12 miles of Danville. Besides this Indiana line there are two other southern connections of the Chicago, Danvile & Vincennes road in contemplation.

A road is projected to run from Danville—or possibly from Rossville, about 18 miles north of Danville—southwestward through Charleston to Flora, the intersection of the Ohio & Mississippi and Springfield & Illinois Southeastern roads. Here, by harmonious arrangements with the Springfield & Illinois Southeastern Company, a very direct north and south route will be formed between Chicago and Shawneetown, and it is proposed to extend the line from Shawneetown to Paducah and thus secure more advantageous southern connections. From Charleston northward a subscription of about $5,000 a mile has already been secured.

Danville, Paris & Vincennes.

The route of about 30 miles of this road, from Danville south to Paris, has been located and a contract for its construction by the 1st of January, 1872, has been made with Mr. Thomas King, who was formerly Chief Engineer of the Indianapolis, Bloomington & Western Railway. South of Paris the location is not definitely fixed. There is talk of continuing to a connection, somewhere near Vincennes, with the projected road of the Cairo & Vincennes Company.

OLD AND NEW ROADS.

Central of Iowa.

The connection of this road with the Milwaukee & St. Paul at Mason City seems not to have proved so valuable or so intimate as was expected. We hear nothing of "through trains between St. Paul and St. Louis" by this route; the Central is extending its line westward toward the Minnesota line, and it is now reported that it will make a connection with the Minneapolis & St Louis Railroad, now in course of construction.

Northern Pacific.

The Mechanical Superintendent of this company, Mr. George W. Cushing, has recently returned from the East, where he ordered a considerable amount of rolling stock for the company's lines, which already amount to about 400 miles, not including the section west of Brainerd, which is still in the hands of the contractors.

The section between Thomson and Brainerd, although now in the possession of the company, will be operated for some time yet solely in aid of construction.

The action of the company in assuming the completion of the canal across Minnesota Point at Duluth, which will secure that place a good harbor, is taken by the people there as satisfactory evidence that this company will never seek another lake terminus. There are, however, still reports, believed by some who claim to have "inside" information, that the company will at no very distant period continue its line eastward from Duluth along the southern shore of Lake Superior to Bayfield, where there is a magnificent harbor.

A telegram from St. Paul, dated the 26th ult., says:

"A military expedition is now fitting out at St. Paul, which will have the double object of escorting the engineers of the Northern Pacific Railroad, while making the final location of the line through Western Dakota and Eastern Montana, and of repressing any hostile demonstrations of the Sioux Indians in the Yellowstone Valley. The expedition will consist of seven companies of infantry—420 men—four Gatling guns, twenty-two mounted Indian scouts, twenty-five members of the Northern Pacific Engineer corps, and seventy teamsters and government employes, making a total of about 600 men. The troops will be commanded by General Whistler, and the engineering party will be in charge of General T. L. Rosser, formerly of Confederate cavalry fame, now Chief Engineer of the Dakota Division of the Northern Pacific Railroad. The expedition will leave Fort Rice, on the Upper Missouri, September 6, and will be absent from that point sixty or seventy days. The latest survey of the railroad line through Dakota, crossing the Missouri and the mouth of the Heart River, wholly avoids the bad lands east of the Missouri, and traverses a fertile prairie country the entire distance."

Russian Railroads.

On the 1st of January this year the number of railroads in Russia was thirty-five, with an aggregate mileage of 9,688 versts or 6,423 miles—the verst being about two-thirds of a mile—including the 423 miles of the two State railroads from Moscow to Kursk, and from Elizabethgrad to Krukow. Arranged according to their respective lengths, they stand in the following order: The St Petersburg & Warsaw, with a branch to the Prussian frontier, 800 miles; the Kursk, Charkow & Asow, 506; the Odessa Railroad, 452; the St. Petersburg & Moscow (Nicholas Railway), 400; the Moscow & Kursk, 333; the Orel & Witepsk, 324; the Moscow & Nischni-Novgorod, 272; the Moscow & Smolensk, 261; the Baltic Railwav, 255; the Warsaw & Vienna, 215 miles on Russian Territory; the Orel & Griasy, 189; the Rybinsk & Bologoje, 185; the Kieff & Brest-Litowsky, 184; the Moscow & Jaroslay, 176; the Dunaburg & Witepsk, 161; the Riga & Dunaburg, 135; the Ryasan & Koslow, 131; the Moscow & Ryasan, 130; the Griasy & Tsaratzin, 129; the Warsaw & Terespol, 128; the Koslow & Woronesch, 111; the Warsaw & Bromberg, 91; the Elizabethgrad & Krukow, 90; the Riask & Morschansk, 80; the Tambow & Saratow, 73; the Schuya & Ivanovo, 56; the Grewschewsk & Rostow on the Don, 52; the Wolga Railway, 48; the Tambow & Koslow, 45; the Peterhof Railway, 34; the Riga & Mitau, 27; the Novo-Toryok Railway, 21; the Lodz Railway, 17, and the Tsarskoje-Seto-Pavlowsk, 17 miles.

These thirty-five railroads carried, last year, an aggregate of 14,685,988 passengers and 674,150,970 poods, or about 13,500,000 tons of merchandise, the total gross receipts for which amounted to 78,636,438 roubles, about $45,000,000. Calculating these receipts by the length of the different railroads, we find the earnings of the St. Petersburg & Moscow (or Nicholas) Railway to be more than $28,000 per mile; then follows the Moscow & Ryasan with above $22,500; and the receipts of the Tsarskoje-Seto were about $18,000, as were also those of the Ryasan & Koslow. The Moscow & Nischni-Novgorod realized $11,000 per mile, as did the Moscow & Kursk. The receipts of the Riga & Dunaburg and of the Warsaw & Vienna were $10,000 per mile; the Peterhof Railway and the St. Petersburg & Warsaw, $9,000; the Wolga Railway and the Dunaburg & Witepsk, $8 000; the Orel & Witepsk and the Kursk & Kieff, $6,800; the Warsaw & Bromburg and the Grewschewsk & Rostow, $5,600; the Riga & Mitau, the Koslow & Woronesch, and the Warsaw & Terespol, $4,5 0; the Schuya & Ivanovo, the Ryask & Morschansk, and the Lodz Railway, $3,400.

Kentucky & Great Eastern.

The Pr sident of this company in a report recently published gives the following programme of the work laid out for it:

"The object of the company, for the present, is to make a new line of railway, by consolidation and otherwise, from the principal business centers of the southwestern interior States, such as Cincinnati, St. Louis, Louisville, Memphis, etc., through a section of country full of natural resources, to tide-water at the city of New York, affording equally advantageous connections with other large cities of the Atlantic seaboard, that will be shorter by a sufficient number of miles to command the business of these points and the adjacent country, of easier grades, and at a much less cost than either of the present great East and West railway thoroughfares.

"It is proposed to commence such a line at Newport or Covington, Ky., opposite the city of Cincinnati, at which points connections now exist with St. Louis and Louisville; from thence running upon the southern bank of the Ohio River above high-water mark to the Big Sandy River, where connections are made with the Chesapeake & Ohio Railroad, and the interior towns of Virginia, and the cities of Richmond and Norfolk; thence it will pass to the western line of the State of West Virginia, through which State it will be continued, by special charter already granted, upon the table lands of the mountains that divide the waters of the Kanawha and Monongahela; thence by special charter across the States of Virginia and Maryland, and through the southeast corner of the State of Pennsylvania to the State of New Jersey; thence by running arrangement or consolidation over roads already constructed across the State of New Jersey to the city of New York; the whole distance from the city of Cincinnati being *six hundred and forty miles*, with maximum grades going east from Cincinnati to Catlettsburg, 130 miles, of *fifteen* feet to the mile; from Catlettsburg east 140 miles, *twenty-six* feet to the mile; and the next 138 miles of *twenty-two* feet to the mile."

The President (S. W. Morton, of New York) estimates the cost of the road at $17,430,000, completely equipped, though whether this is for the part west of the Potomac or not we do not understand. If so, by his figures, it would be about $43,000 per mile. The distance from Catlettsburg to the proposed crossing of the Potomac, as we have said before, is not less than 270 miles in an air line, and we cannot see how a route only 630 miles long can be made in this way between Cincinnati and New York. The company would be fortunate to find a practicable route between Catlettsburg and Point of Rocks only 300 miles long, and this would make the distance to Baltimore 500 miles, and to New York about 700 miles. This, however, would be shorter than any other, and would be equally favorable for Baltimore and Philadelphia.

Frederick & Pennsylvania Line.

This road is now completed between Tarrytown and Littletown, about ten miles. This forms an extension into Maryland of the Gettysburg Railroad.

Lynchburg & Danville.

A large force is at work on the grading of this road, which is to be completed from Lynchburg to Staunton River by June, 1872, and through to Danville, about 75 miles, by the close of that year.

Boston, Barre & Gardner.

This railroad extending from Worcester, Mass., north by west 23½ miles to a connection with the Vermont & Massachusetts Railroad at Gardner, is completed, and regular trains are to commence running on Monday, the 4th inst. For the present the track of the Nashua & Worcester Railroad will be used from Barbour's Crossing into Worcester.

Pittsburgh, Virginia & Charleston.

The contracts for the construction of the first ten miles of this road, have been awarded to Messrs. F. Gwinner & Co., E. Howard, C. H. Love, Utzy, Scott & Wheeler, P. & T. Collins and D. W. Williams. The contract for the trestle work was awarded to G. W. Bitner.

Adrian & Saline.

A proposition has been made for the construction of this railroad, which will be about 22 miles long, from a branch of the Detroit, Hillsdale & Indiana Railroad, and give the Michigan Central access to Adrian, the chief town of Southern Michigan.

Toronto, Grey & Bruce.

This company has negotiated its entire loan in London to provide for the extension of the road to Owen's Sound. The contract for the extension has been let to M. F. Shanley, of Toronto.

Quebec & Gosford.

This company after six months delay has accepted the proposition made by the contractor, Mr. J. B. Hulbert, to lease the road for three years, the company giving him $100,000 worth of bonds at 60 per cent., which amount is to be spent at once to equip the road, erect sheds, etc. Mr. Hulbert guarantees the shareholders 6 per cent. on their stock, and 7 per cent. on the $100,000 of bonds, the contract to take effect on the 1st of September next. Two locomotives have been ordered from the Rhode Island Locomotive Works. First-class passenger cars will be put on the line, and we understand it is the intention to run three trains a day each way.—*Canadian Monetary Times.*

Sheboygan & Fond du Lac.

The contract for building this road from Fond du Lac west to Princeton has been let to Wells, French & Co.

Atchison & Nebraska.

A dispatch from Mr. F. R. Firth, Superintendent of the company, gives the information that the road was opened to Salem, in Nebraska, about 30 miles northwest from White Cloud, on the 23d of August. By the middle of September it is expected the road will be opened ten miles farther northwest, to Humboldt. Between Humboldt and Table Rock, 8 miles, the grading is under contract to be finished on the 15th of September.

Paris & Decatur.

Track-laying on this railroad was commenced at Paris, Ill., on the 30th ult. The grading is completed to within 20 miles of Decatur.

Western & Atlantic.

A telegram from Atlanta dated the 30th ult. says that the archives of this State road, Atlanta to Chattanooga, were that day turned over to a committee of citizens. This action was the result of a series of prosecutions carried on for several days past, during which the late Auditor, Treasurer, General Ticket Agent, Master Mechanics, and several merchants have been held to bail to answer for frauds on the Treasury. The road is exclusively the property of the State, but it has been for some time operated by a private company to which it is leased.

Hannibal & Central Missouri.

This road, which has been for some time in progress from Hannibal westward, 70 miles, to Moberly, Mo., on the North Missouri road, was completed on the 21st of August. The road forms an important western connection for the Toledo, Wabash & Western road, being on nearly an exact air-line between Toledo and Kansas City, and making the distance between these places, *via* the North Missouri, 660 miles—42 miles shorter than the present route *via* the Hannibal & St. Joseph road.

Osage, Neosho & Walnut Valley.

This Kansas company has lately organized with the following officers: President, L. J Crawford, of Emporia; Vice-President, W. J. Cameron, of Eldorado; Secretary, E. P. Bancroft, of Emporia; Treasurer, J. M. Jones, of Arvonia. The road is to run from Ottawa westward through Emporia to the valley of the Walnut River and thence southward to Arkansas City; $175,000 in bonds of Franklin and Osage counties have already been subscribed.

Union Pacific.

A late number of the Omaha *Herald* says:

"The average cost of operating American railways is about 70 per cent. of the gross earnings. The average per cent. of operating the Union Pacific Railway is now about 40 per cent., and will never exceed 50 per cent. in the future.

"Just after the last spike had been driven on the Union Pacific Railway, its able superintendent of construction declared that it would be the cheapest road to operate in the world. The fact is demonstrated, and all attempts to impeach it will fail. Wall street is at liberty to apply its crucial tests, in any way it pleases, to the claims of this paper, based upon the financial statements of the Union Pacific managers. They are, we admit, both startling and remarkable, and it causes us no surprise that they are severely challenged by Eastern operators and financiers. In fact, they have surprised themselves. But careful investigation and study of the actual condition of the road and its rolling stock compels us to declare that the reduction of expenses to 40 per cent. has been made without the slightest sacrifice in regard to either. On this road, as on all roads, iron will wear out, and so will rolling stock; but there is not a road in the country that is held at a higher standard in regard to repairs of rolling stock or condition of track."

Lockport to Tonawanda.

It is estimated that this projected road, 14 miles long, can be built for $20,000 a mile. The Erie Railway Company, on the 23d of August, made a proposition to lease the road in perpetuity, and pay semi-annually (as rent) the sum of $24,000, being the interest at 6 per cent. on $200,000. Mortgage bonds and 6 per cent. dividends on the same amount of stock, payable semi-annually. The Erie Company, in addition, to pay all taxes and assessments, and finish, equip and operate the line as a first-class road.

Holyoke & Westfield.

This Massachusetts road, from Holyoke southwest about 12 miles to Westfield, is now very nearly graded and track-laying will begin next Monday, to be completed by the 1st of October.

Augusta & Hartwell.

This Georgia road, is projected to run from Augusta nortwestward to Clayton, in the northeast corner of Georgia. The company are now letting contracts for grubbing along the line and expect to commence work early in the present month.

Utah Central.

Of this railroad the Salt Lake *Herald* says: "The road is graded as far as Dry Creek, and the track laid as far as the elevated ground just this side of that point, about twelve and a half miles from the city. Here it is calculated to make the freight and passenger depots for Big and Little Cottonwood on the east, and for Bingham on the west. This point is about four miles west of the present transfer station for the Little Cottonwood mines. Extensive switches and depot buildings, we understand, are to be erected here immediately, so that as soon as the road can be made to the mouth of Cottonwood, the ores from that canon can be shipped by rail."

St. Louis & Keokuk.

The Alexandria, Mo., *Commercial* says: "The grading from Gregory's Landing is completed south about four miles. From Canton, three and a half miles of this road is graded north. Work on Fox Island is going right along and with the exception of a little "hitch" concerning the right of way and running the road through some of the streets in this city, there is every indication that the road will be completed by the first of January next. The contract for the bridges has been let. The building of the bridge across the Des Moines was given to a Chicago company, who will put it in position on sixty days notice."

Lowell & Framingham.

This railroad, opened last week, is 26 miles in length, in a general north and south direction, connects Lowell, on the Boston & Lowell Railroad and the Concord (N. H.) Railroad, with Framingham, a point on the Boston & Albany and also the terminus of the Milford Branch of the last-named road, and of the Agricultural Railroad. The Lowell & Framingham line passes through Sudbury, West Concord, Acton, Westford and Chelmsford. The charter was granted only fifteen months ago. The stock amounts to $500,000, and the funded debt to the same amount. Willis Phelps & Co., of Springfield, were the contractors.

Following is a list of the officers and directors: President, Hon. E. B. Carpenter, of Foxboro'; Superintendent, H. A. Blood, of Fitchburg; Treasurer, Hon. George E. Towne; Clerk, Hosea Hyde, of Newton; Chief Engineer, W. F. Ellis, of Ashland. Directors, Hon. E. B. Carpenter, H. A. Blood, George E. Towne, George A. Torrey, Daniel Wetherbee, Ralph Warner, Wm. F. Ellis, Peter B. Brigham, David Lane, Lyman Nichols, James W. Clark, Solomon H. Howe, Hosea Hyde.

Cape Girardeau & Iron Mountain.

We are indebted to Mr. Alexander Ross, the Secretary of this company, for the following information concerning its road, which is to be of 3-feet gauge:

It was duly organized—the charter dating the 17th of July last—by the election of L. Houck, President; G. H. Greene, Vice-President; G. C. Williams, Treasurer; M. M. Kimmel, Chief Engineer, and Alexander Ross, Secretary. The road is intended to convey the ores of the Iron Mountain to the river at Cape Girardeau, and, in addition thereto, to connect *via* Salem, in Dent County, with the Laclede & Fort Scott Railroad, and thus form a continuous line on the 3-feet gauge from Cape Girardeau to Fort Scott, in Kansas. Efforts are now being made to join with the Laclede & Fort Scott Company and induce them to adopt the 3-foot gauge, with what success cannot as yet be stated.

Mr. Ross also sends estimates of the cost of a mile of the road, which, however, were originally calculated for 30-inch gauge, as follows:

AVERAGE COST OF ROAD PER MILE.

Clearing and grubbing	$ 100 00
Excavating 5,000 cubic yards, at 25c	1,250 00
40 feet of bridging, at $6 per foot	240 00
3,520 cross-ties, 5 ft. 6 in. face, at 15c	528 00
31½ tons T iron (20 lbs), at $75 per ton	2,362 50
320 rail-splices, at 45c each	148 50
3,520 lbs spikes, at 6c	211 20
750 cubic yards balasting, at 50c	375 00
Laying track	350 00
Engineering	150 00
One mile finished	$5,615 20
Total length road (70 miles) at same rate	$393,064 00

In estimates of the cost of rolling stock the cost of an 8-ton loc motive is given at $4,500; of platform cars carrying three tons each, $175; of passenger car with seats for twenty, $800; of box cars carrying three tons each, $4,000. At this rate it is estimated that the road could be equipped for $34,900, and the entire equipment would have a capacity for 80 passengers and 102 tons of freight—about

equivalent to that of two ordinary passenger and ten freight cars. The weight of platform cars is given as one ton; of box cars, two tons.

In estimating the earnings, a train is made to consist of one passenger, two box, and fifteen platform cars, the platform cars to be fully loaded one way, the covered cars averaging full loads of way freight half the distance, and the passenger car averaging half loads, at 2½ cents per ton per mile for all freight and 3 cents per mile for passengers. At this rate a daily income of $787.50 is reckoned, of which 40 per cent. is allowed for expenses.

Chicago & Iowa.

The Oregon *Reporter* says: "Work on the railroad bridge at this place is progressing rapidly. Forty men are now at work upon the structure, which is expected to be ready to receive the track by the 20th of September. The bridge is the Howe truss patent. Its entire length is 990 feet, and its estimated cost $90,000. It is said that, when finished, it will be the most substantial bridge on Rock River. The grading between Oregon and Mount Morris is about two-thirds done. Some very heavy work is encountered, which will prevent the completion of the road to Mount Morris as soon as was anticipated. One cut is reported, three miles west, 27 feet deep. This is the deepest cut on the road, thus far. It is said that the Chicago & Iowa Company have arranged, when their road shall have been completed to Forreston, to run trains over the Illinois Central to Dunleith. In the meantime the road will be pushed westward from Forreston until the Iowa connection is reached." The Galena *Gazette*, copying this, says: "We have different reports up this way. It is understood here, and is believed by some parties in Dubuque, that the road has been sold out to the Illinois Central, and that it will never cross their track, but will terminate at Forreston."

With regard to this last report, it may be said that the Chicago & Iowa has a contract for a lease of the road from Dubuque down the west bank of the Mississippi, which it cannot reach except by crossing the Mississippi as far south at least as Bellevue. It is quite possible that an extension may be postponed for the present, but, unless the lease of the Iowa road be transferred to some other party, it will be necessary to make the extension eventually. Meanwhile preparations have been made for an extension of the Dubuque & Bellevue road down the Mississippi to Clinton, and it is believed that it will for a time find its Chicago outlet over the Clinton Bridge and the Prophetstown Branch of the Chicago, Burlington & Quincy Railroad, which is being extended to the Mississippi.

Fremont, Elkhorn & Missouri Valley.

The West Point (Neb.) *Republican* says that the last fifteen miles of this railroad has been examined and reported favorably upon by the Commissioners for the State. This road has drawn one hundred thousand acres of land from the State, being the full amount to which it was entitled.

European & North American.

The Boston *Advertiser* said last week: Only eight miles of track remains to be laid on the European & American Railroad, which is between Danforth and the bridge in Bancroft. On the Vanceborough end, two trains are ballasting, aided by the steam shovel, which is located in the Dudley gravel pit, a short distance from the Calais road. On Tuesday night, the iron was laid through the village of Danforth, and the engine waked up the natives with its screams. All hands turned out and a general jubilee was had in honor of the arrival of the steam horse. On the other end the iron is laid to the bridge across the Mattawamkeag, in Bancroft. The piers and abutments for the bridge will be completed within a day or two, and the bridge will be immediately put in place.

Burlington & Missouri River Railroad in Nebraska.

We are indebted to Mr. F. W. D. Holbrook, Assistant Chief Engineer and Assistant Superintendent of this railroad, for the following description of the present condition of the road, in a letter written at Plattsmouth, Neb., August 16:

"As a few items concerning our road may be of interest to you in keeping you posted, I here send the following:

"Track-laying commenced April 12, 58 miles from Plattsmouth and three miles west of Lincoln, and is to-day on the one hundred and eighteenth mile from here, making some sixty miles laid thus far this season. Track-laying is now progressing at the average rate of a mile per day for working days, and it is expected will reach the Platte River, in the vicinity of Fort Kearney, about the 1st of November, giving us 180 miles to operate. The Platte River will be bridged during the winter, taking advantage of the ice to facilitate pile driving, and a connection made with the Union Pacific Railroad in the early spring of 1872.

"We are now running trains to a point 115 miles west of Plattsmouth. Between Plattsmouth and Dorchester, 83 miles, all culverts and bridge abutments will be of masonry, but west of that point, for the present, pine bridging is used, ultimately, however, to be replaced by masonry, the great distance stone has to be transported rendering it not advisable to put it in at present.

"The grading of the road from Dorchester to a junction with the Union Pacific Railroad, 107 miles, was let in April to John Fitzgerald, of this place, and will be finished by the middle of October. The grading averages about 10,000 yards to the mile, is mostly barrow dirt and good material to handle. No novel engineering features exist in connection with the road, the longest single-span truss bridge being 150 feet in length and of the ordinary Howe pattern.

"The company has nine locomotives of Manchester make, 100 combination box and freight cars, and 100 flats, principally from the Chicago, Burlington & Quincy shops. Also ten passenger coaches, mostly of Osgood & Bradley's make, Worcester, Mass., and four baggage, express and mail cars, of the Chicago, Burlington & Quincy make—being altogether first-class rolling stock and agreeing well with the character of the road generally, which is well built with oak ties and fish-plate iron."

The new stations beyond Lincoln, which is 55 miles from Plattsmouth, with their distances from Plattsmouth, we take from a time table dated the 16th:

	Miles.
Denton	65
Highland	73
Crete	75
Dorchester	83

The stations west of Dorchester were probably not then located, as they do not appear on the time table.

From Lincoln to Crete the direction of the line is southwest; from Crete to Fort Kearny it is nearly due west.

Iowa Southwestern.

We are informed by the President of the Iowa Southwestern Construction Company, which is organized to build this road, that about 80 miles of the road, from Clinton to Iowa City, have been located. The line will keep near the Mississippi River from Clinton south to the Wapsipinicon River, and along the valley of that river nearly due west to Tipton, and thence a little south of west to Iowa City. The iron and ties for this part of the road are purchased, and the grading is well under way. It is expected to have the iron laid to Iowa City this year.

Radford Iron Company's Railroad.

Mr. Richard B. Roane, the Chief Engineer, is completing the surveys for this railroad, which is to extend from a point on the Atlantic, Mississippi & Ohio Railroad ten miles below Dubuque, southward through the iron regions of Pulaski County to the company's furnaces and beyond to Carroll County. The road will be 18 miles long and of 30-inch gauge.

Decatur & State Line.

Early in the summer work was commenced at several points on this road. It was soon discontinued, but now the company advertises for proposals for the grading and trestle bridges on the first division, from the junction with the Rock Island road at Mokena southward to the Kankakee River, 25 miles. Bids will be received at the office, Room 16, Bryan Block, Chicago.

St. Louis & Creve Coeur.

It is proposed to construct a light railroad chiefly for suburban traffic from St. Louis a little north of west to Lake Creve Coeur, a distance of about 16 miles. It will be a few miles south of the line of the North Missouri Railroad.

Hannibal & Central Missouri.

This railroad, from Hannibal west to Moberley, on the North Missouri Railroad, is completed, and trains will soon run over it regularly. It will be under the control of the Toledo, Wabash & Western Railway Company, which will soon run trains through between Kansas City and Toledo, using the North Missouri between Kansas City and Moberly.

Davenport & St. Paul.

A correspondent writing from Davenport, Ia., under date of August 28, says: "The Davenport Railway Construction Company is composed of Eastern and Davenport capitalists, with Ben. E. Smith, of Columbus, Ohio, at their head as President, and is ironing, completing and equipping the Davenport & St. Paul Railway. They have recently commenced in earnest, and have track down to Dixon, 24 miles from Davenport, and are progressing at the rate of half a mile per day. The grading and the bridging is almost finished for 100 miles further, and is being vigorously pushed by the railway company, through their energetic President, Hon. Hiram Pierce. The railway company is operating a branch from Eldridge Junction to Maquoqeta, 31 miles, and using the main line to Davenport, 12 miles, or 43 miles in all. From Maquoketa the intention is to ultimately build to Dubuque, 30 miles. Prospects are flattering for the early completion of the main line, an important one, as may be seen by its connections east and west."

Cleveland, Columbus, Cincinnati & Indianapolis.

It is reported that all that part of this road between Cleveland and Indianapolis, 207 miles, is to have a second track laid shortly.

Iowa Pacific.

A construction company has been established in Fort Dodge for the purpose of building this road from Fort Dodge northwest to Clarion, the county seat of Wright County, 30 miles. It is proposed to extend the road west by south from Fort Dodge to the Maple River, in Ida County, and run thence over the proposed Maple Valley road to the Missouri near Onawa.

Big Sandy Valley.

A correspondent, writing from Catlettsburg, Boyd County, Ky., under date of August 22, says:

"A very important meeting of railroad men from Chicago was held at this place to-day. The object of said meeting was to organize the 'Big Sandy Valley Railroad Company,' to build a road from the mouth of 'Big Sandy,' on the Ohio River, to the Pound Gap in the Cumberland Mountains, there to connect with a branch from the Tennessee & Virginia Railroad. The organization was perfected by electing seven directors, and from said directors a president. The directors are: Caryl Gaytes, John C. Phillips, George Herbert Smith, F. H. Walker, C. Smyth, and George W. Wheeler, of Chicago. Mr. Gaytes was elected President of the road.

"A committee of these gentlemen, under the guidance of our former townsman, Col. J. C. Phillips, now of Chicago, who has worked hard to get this road built, has just returned from an inspecting tour up the Big Sandy Valley. They are loud in their praise of the mineral wealth and agricultural productions of the country. This, together with the enthusiasm of the people along the line of the contemplated road, has been very encouraging to the projectors. The road will be commenced at once."

Buffalo, New York & Philadelphia.

This company (formerly the Buffalo & Washington) has mortgaged its road for $3,000,000 to Joseph Seligman, of New York, and Henry Martin, of Buffalo.

Chesapeake & Ohio.

It is reported that English capitalists have purchased iron and coal lands along the line of this railroad and offer to invest at least a million dollars in the manufacture of iron there if the company will fix the rates of freight for ten years on an acceptable basis. Their proposals will be submitted to the company. A new town called "Huntington," after the President of the company, has been laid out at the Ohio River terminus, which, it is believed, will become an important manufacturing town.

The New York Elevated Railroad.

The Court of Common Pleas in New York has given an order to sell "the West Side Elevated Railway," its track, rolling-stock, right of way, workshops, and "all the corporate property and franchises" of the company, for the benefit of creditors. The sale is to be made September 15. The road is generally regarded as a failure, and it is not expected that it will sell for more than the value of the materials after they are broken up and moved away.

The Atchison Bridge.

The Chicago & Atchison Bridge Company advertises for proposals for the construction of a bridge over the Mississippi at Atchison between Atchison, Kansas, and Winthrop, Mo., to be handed in to the President, James N. Burnes, at Atchison, by the 12th inst. Maps and proposals can be seen at the office of the Central Branch Union Pacific Railroad in Atchison.

Pittsburgh & Connellsville.

The Cumberland (Md.) *News* of the 15th ult. describes the following new branches of this new railroad:

"The branch railroad from Mineral Point, on the Connellsville Railroad, to the town of Somerset, in Somerset County, ten miles in length, has been graded and ballasted, and the work of laying the rails was begun yesterday, and will be completed by September 2d, if no unforeseen event occurs to interfere.

"The branch road from Garrett Station to Berline, in Somerset County, distance eight miles, has been let, and is to be completed within ninety days.

"A large part of the grading on the branch from Meyer's Mills, near Dale City, to Salisbury, has been completed, and work is progressing quite vigorously."

Iowa Railroad Land Company.

No organized effort has hitherto been made for the sales of the Iowa lands granted by Government to the companies building the Chicago & Northwestern's and Illinois Central's Iowa lines, and the Sioux City & Pacific road. This lack of effort has prevented the occupation and improvement of a large portion of Iowa. Of the grant there are now unsold about 1,700,000 acres, and to effect this sale and encourage immigration the Iowa Railroad Land Company has been organized. Mr. John B. Calhoun, late Land Commissioner of the Illinois Central Company, is Land Commissioner of this Company, with headquarters at Cedar Rapids, Iowa.

Tax on Dividends and Interest.

The following decision of the new Commissioner is published in the Philadelphia papers:

TREASURY DEPARTMENT,
OFFICE OF INTERNAL REVENUE,
WASHINGTON, August 14, 1871.

SIR: Yours of the 24th ultimo, respecting liability of the Philadelphia, Wilmington & Baltimore Railroad Company to tax on dividends and interest, was duly received.

You state that Mr. Hinckley, the President of the road, claims exception from liability to tax on dividends declared within the first seven months of 1870, and on coupons or interest represented by them, for the same period, under the provisions of the decision of Judge Strong in the case of Philadelphia & Reading Railroad Company *vs.* Barnes, Collector; and that he further claims exemption from liability with respect to dividends and interest of the last five months of 1870, and with respect to such portion of dividends declared after December 31, 1870, and interest falling due and payable thereafter as represents earnings accrued within the five months aforesaid, under the decision of this office, bearing date of February 27, 1871. You request instructions upon the questions herein presented.

I reply that this office has uniformly required returns of dividends and interest on bonds for the first seven months of 1870, without reference to the decision of Judge Strong, above referred to, and has instructed assessors that if, upon an appeal from the above decision, which has been taken to the Supreme Court of the United States, it should be decided that the tax referred to has been illegally assessed and collected, the proper amounts will be refunded by this office.

You will please be governed by the above instructions in the case presented by you, and cause the proper assessments of tax on dividends and interest due from the Philadelphia, Wilmington & Baltimore Railroad Company to be made at the rate of five per cent.

I enclose you Specials Nos. 100 and 104, relative to tax on dividends and interest. The effect of Special No. 104 is to relieve from liability to tax, with respect to interest or coupons falling due and payable, or accruing within the aforesaid five months, where the same were paid in full prior to May 13, 1871.

Assessments of tax, at the rate of 2½ per cent., should be made upon all interest falling due and payable, and *accrued*, since December 31, 1870.

A like tax should be assessed with respect to all dividends declared on and after August 1, 1870; and such tax should be passed to the Collector for collection, notwithstanding the fact that it may have been assessed with respect to dividends paid in full to the stockholders under the rulings of the late Commissioner.

You will please report the action taken by you in relation to this company to this office. Respectfully,

J. W. DOUGLASS, Commissioner.

Alex. P. Tutton, Esq., Supervisor Internal Revenue, Philadelphia, Pa.